

THE NEARCTIC SPECIES OF THE *BEZZIA BIVITTATA* GROUP (DIPTERA: CERATOPOGONIDAE)

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Abstract.—The *bivittata* Group of the genus *Bezzia* Kieffer, subgenus *Bezzia*, is comprised in North America of at least 15 species, of which the following 12 are described as new: *aklavakensis* from Canadian Northern Territory, *andersonorum* from Maryland, *capitata* from Honduras and Arizona, *chelistyla* from Arizona, *gibberella* from Maryland, *luteiventris* from Virginia, *mohave* from California, *nigripes* from Utah, *sandersoni* from Arizona, *setosinotum* and *spathula* from Maryland, and *texensis* from Texas. Diagnoses are given of all taxa, a key is presented, and all species are illustrated.

This review is one of a series in which additions and corrections are made to the "Revision of the Nearctic Species of the Genus *Bezzia*" by Dow and Turner (1976). In the present series six groups have already been studied in depth since 1976: Grogan and Wirth (1981) on the genus *Amerohelea* Grogan and Wirth; Wirth and Grogan (1982) on the genus *Phaenobezzia* Haeselbarth; Wirth (in press) on the *bicolor* Group, Wirth (in press) on the *cockerelli* and *dorsasetula* Groups, and Wirth *et al.* (in press) on the *annulipes* Group of *Bezzia*, subgenus *Homo-bezzia*; and Wirth (in press) on the *nobilis* Group of the subgenus *Bezzia* s.s. The present paper deals with a second group of *Bezzia* s.s., here named the *bivittata* Group.

In addition to the revision by Dow and Turner, we urge that users of our *Bezzia* papers also refer closely to the excellent revisions of the Soviet species by Remm (1974a, 1974b). We believe that Remm reached a sound basic understanding of the characters useful in recognition of natural groups within the genus *Bezzia*, although we would disagree in one or two instances whether certain groups should be given generic or subgeneric status. Starting with the characters used by Remm, we will offer short diagnoses that should explain the basis of our group classification. We wish to stress that our present treatment is to be considered provisional and for this reason we will try to be as conservative as possible.

In addition to Remm's important papers, we have drawn on several other recent works on *Bezzia* for an evaluation of group characters. Clastrier (1962) presented excellent descriptions and figures of a large number of Palaearctic species but made very little attempt to place them in systematic groups or to take into account the species poorly described by earlier authors. Haeselbarth (1965a, 1965b, 1975) treated three groups of African species in similar detail, but added excellent diagnoses and taxonomic discussions of the *africana* and *nicator* groups, and the group which he separated off as the genus *Phaenobezzia* Haeselbarth. Tokunaga (1966) made no attempt at group classification when he offered excellent descriptions and figures of the New Guinea species.

Taxonomic characters employed for identification of adult ceratopogonids were described by Wirth (1952), Dow and Turner (1976), and Wirth *et al.* (1977). Wing

length is measured from the basal arculus to the wing tip and costal length from the basal arculus to the costal apex. Costal ratio is the costal length divided by the wing length. Antennal ratio of the female is the sum of the lengths of the elongated five distal flagellar segments divided by the sum of the lengths of the preceding eight; male antennal ratio is obtained similarly since the five distal antennal segments are also elongated in this group. Palpal ratio is the length of the third palpal segment divided by its greatest breadth.

The holotypes and allotypes of our new species are deposited in the U.S. National Museum in Washington, D.C. Paratypes as available will be deposited in the British Museum (Natural History), London; Muséum National d'Histoire Naturelle, Paris; Canadian National Collection, Agriculture Canada, Ottawa; and the California Academy of Sciences, San Francisco.

Genus *Bezzia* Kieffer

Bezzia Kieffer, 1899:69. Type-species, *Ceratopogon ornatus* Meigen, by original designation.

Diagnosis.—Large, nearly bare, predaceous midges. Body not unusually slender or dorsoventrally flattened. Antenna short to moderately long. Palpus 5-segmented, 3rd segment longest, not thickened, with scattered sensilla. Female mandible with 10–20 coarse teeth and with finer proximal teeth in series. Thorax robust, mesonotum usually with anterior spine or tubercle, with several strong supra-alar and postalar setae. Wing with 1 radial cell, vein R2+3 absent; costal ratio 0.6–1.0; vein M2 originating near r-m crossvein but may be slightly more distad or proximad; macrotrichia absent. Legs slender, sometimes with numerous spine-like setae; fore femur with 0–12 ventral spines; 4th tarsomere short and more or less cordiform; 5th tarsomere without ventral batonnets or strong, sharp-tipped setae; female claws simple and equal, usually with small basal tooth on inner face; male claws cleft apically. Female abdomen with 1–5 pairs of sclerotized gland rods arising from anterior margins of terga; 2 spermathecae present, occasionally a 3rd, rarely only 1 spermatheca. Male genitalia inverted, 9th tergum short with prominent setose cerci, without sclerotized apicolateral processes; aedeagus shaped variously, usually triangular in outline; parameres fused to form an unpaired distal process, usually rod-like but sometimes variously shaped; dististyle well developed and articulated.

Bezzia is closely related to the large, widespread genus *Palpomyia* Meigen. Most of the *Palpomyia* species groups can be distinguished from *Bezzia* by habitus or genitalic structure; in all cases the presence of vein R2+3 and 2 radial cells will distinguish species of *Palpomyia* and its relatives from *Bezzia*. Remm's doubts about the independence of *Bezzia* and *Palpomyia* arose from his inclusion in *Bezzia* of *Phaenobezzia* as a subgenus. We support Haeselbarth (1965b) in according generic status to *Phaenobezzia* in view of the remarkable structure of the male genitalia with non-articulated dististyle, presence of sharp, spine-like setae ventrally on the 5th tarsomere of the female, long costa (costal ratio 0.92–0.87), and slender legs without distinct bands or ventral spines on the fore femur. Likewise the species *Bezzia frontispina* Dow and Turner is anomalous in *Bezzia* and we (Grogan and Wirth 1981) placed it in the new genus *Amerohelea* with a Neotropical group of species with 1 spermatheca, 1 pair of gland rods placed

extremely laterad on the anterior margin of the 8th tergum, and in most of the species with 2 radial cells in the wing.

Synoptic Key to Subgenera and Groups of Nearctic *Bezzia*

- 1. Male antennal segment 12 no longer than 13, antennal plume weakly developed; (mesonotum dull, occasionally weakly shiny, brownish or grayish with or without vittae; tibiae pale or with a dark medial or basal ring; spines of fore femur stout when present; female with 0–5 pairs of gland rods; males considerably smaller than females; male aedeagus triangular with minute spinules or hairs) (Subgenus *Homobezzia* Macfie) 2
- Male antennal segment 12 longest; antennal plume well developed, extending at least to apex of 13th segment; (mesonotum black, shiny or dull or with silvery hairs, if grayish brown with dark vittae, the hind tibia is yellow in midportion, apex broadly black, and all femora bear spines; tibiae often black; fore femur with spines slender when present; female abdomen with 1–2 pairs of gland rods; males about same size as female; male aedeagus variable but not as above) (Subgenus *Bezzia* Meigen, s.s.) 5

Subgenus *Homobezzia* Macfie

- 2. Larger species, female wing 1.3–3.4 mm long; mesonotum without bristly setae on disc; (fore femur without spines or with 1–4 stout to slender spines of similar lengths, with or without strong basal tubercles; pupal respiratory horn with numerous (25–60) spiracular openings, apex more or less flared, abdominal tubercles well developed) 3
- Small species, female wing 1.2–1.3 mm long; mesonotum with 2 rows of strong bristly setae on disc; (fore femur with 5–7 stout ventral spines of alternating uneven lengths arising from distinct elevations; pupal respiratory horn with only 7–12 spiracular openings, abdominal tubercles small) *dorsasetula* Group
- 3. Fore femur unarmed ventrally *bicolor* Group
- Fore femur armed ventrally with one or more short black spines 4
- 4. Fore and mid femora entirely dark brown or with dark bands apical *cockerelli* Group
- Fore and mid femora with subapical dark bands *annulipes* Group

Subgenus *Bezzia*, s.s.

- 5. Fore femur usually unarmed ventrally; legs brown to black; femora and tibiae usually with narrow pale rings, rarely femora pale at base or tibiae pale *bivittata* Group
- Fore femur armed ventrally with one or more slender black spines; legs brown to black, or if banded the pale bands broad 6
- 6. Legs broadly yellow or with broad yellow median bands on fore femora and tibiae *nobilis* Group
- Legs primarily dark brown to black, at most one pair of legs with broad yellowish bands *expolita* Group

Dow and Turner (1976) separated the subgenus *Pseudobezzia* Malloch from *Bezzia* s.s. by the presence of 1 or more very large stout setae on the vertex, but this seta varies so much in size among species that it is only useful but not reliable. Most of Dow and Turner's *Bezzia* s.s. would fall in *Homobezzia* Macfie according to Remm's (1974a) characterization. From the structure of the male genitalia and female spermathecae Remm's subgenus *Sivabezzia* appears to be very similar to the *expolita* Group of *Bezzia* s.s. Dow and Turner's subgenus *Aspinabezzia* is a combination of *Homobezzia* and *Bezzia* s.s. in which the fore femora lack ventral spines.

Subgenus *Bezzia*, s.s.

Diagnosis.—Thorax usually dark brown or black; mesonotum shining or dull with silvery hairs or pollinose markings. (In the *nobilis* Group the mesonotum is pollinose grayish brown with dark vittae but the hind tibia is yellow in midportion and the apex broadly black, and all the femora bear scattered spines.) Antero-marginal spine of mesonotum absent. Males and females more or less of same size. Male antennal plume well developed, extending at least to apex of 13th segment; 12th segment longest. Fore femur with 0–6 spines; tibiae often black. Female abdomen usually with a single pair of gland rods.

Bezzia (*Bezzia*) *bivittata* Group

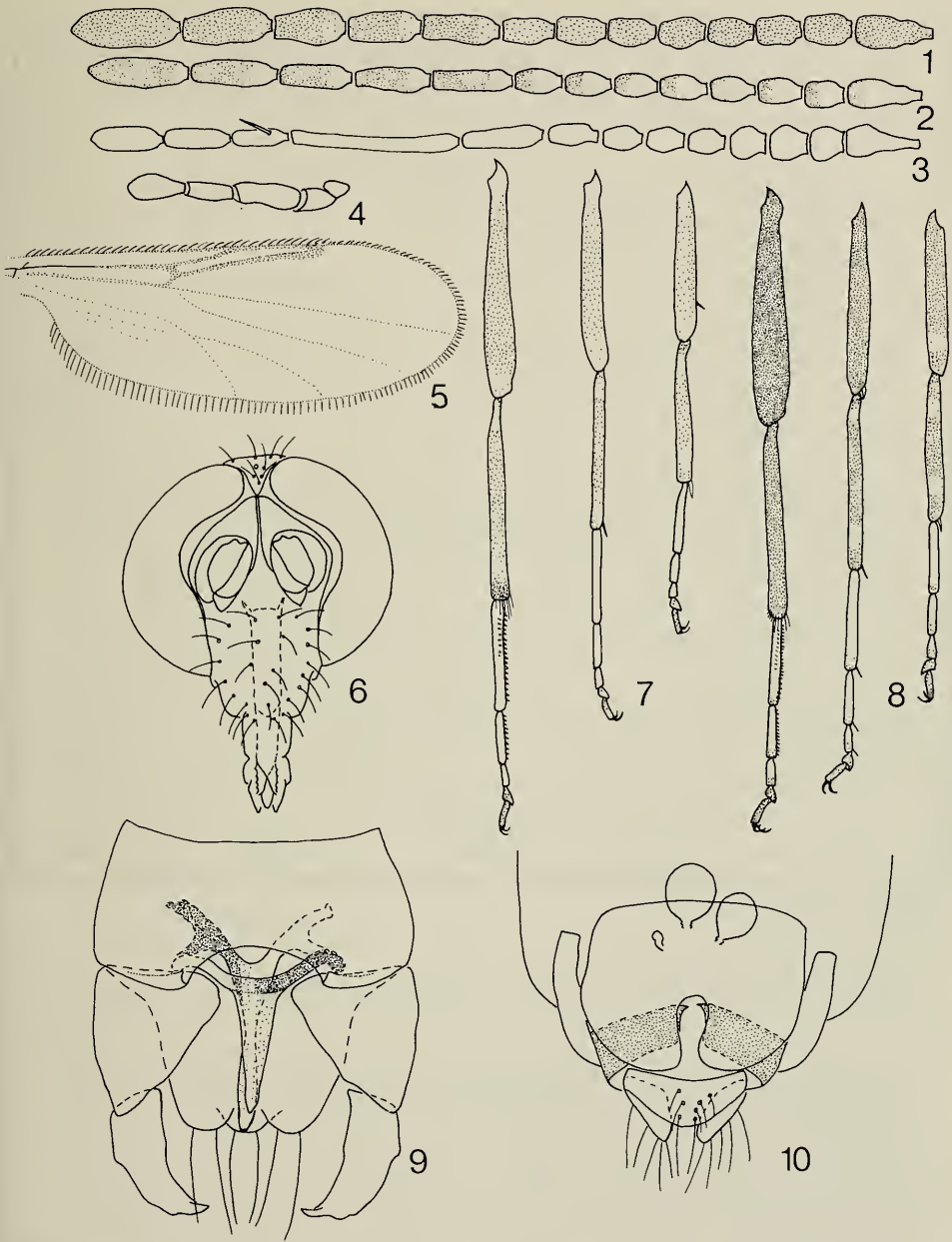
Figs. 1–10

Diagnosis.—Small, more or less black species, wing length 1.0–1.4 mm. Vertex (Fig. 6) with median seta not very strong. Segment 13 of male antenna with long black basal seta (Fig. 3). Legs (Fig. 8) usually black, narrow pale rings usually present subapically on some femora and tibiae and subbasally on some tibiae; hind femur and tibia usually without pale rings. Fore femur usually without ventral spines (one rarely present as in Fig. 7). Male aedeagus (Fig. 9) lacking ventral setulae and usually with a more or less hyaline, smooth, rounded tip. Distal process of parameres and basal arch of aedeagus variously shaped, affording good specific characters.

Species of this group may be separated for the most part from those of the *expolita* Group by the absence of femoral spines, presence of short, distinct necks on the spermathecae (Fig. 10), and the short setae on the vertex (Fig. 6).

Key to the Species of the *Bezzia bivittata* Group

1. Halter pale, at least on the knob; female abdomen usually contrasting bright yellow, eighth sternum brownish 2
- Halter dark brown; female abdomen brown 6
2. Femora and tibiae uniformly yellowish *flavitibia* Dow and Turner (female)
- At least hind femur brown 3
3. Femora solid brown, tibiae uniformly pale; male basistyle bulbous 4
- Legs brown, at most with narrow pale rings; male basistyle various ... 5
4. Larger species, female wing length 1.23–1.24 mm; female antennal ratio 1.06–1.10; male aedeagus (Fig. 55) with distal process narrow proximally, tip broad and spatula-shaped, basal arms broader .. *spathula* n. sp.



Figs. 1-10. 1-10, *Bezzia bivittata*; 1-8, 10, female; 9, male: 1-3, antenna; 4, palpus; 5, wing; 6, head, anterior view; 7, hind, mid. and fore legs (left to right); 9, 10, genitalia.

- Smaller species, female wing length 1.05-1.11 mm; female antennal ratio 0.89; male aedeagus (Fig. 36) slender and rod-like to tip, basal arms narrower *luteiventris* n. sp.
- 5. Hind tibia uniformly dark to tip; male basistyle short and stout but without prominent basal lobe; lobes of aedeagus very long and proximally

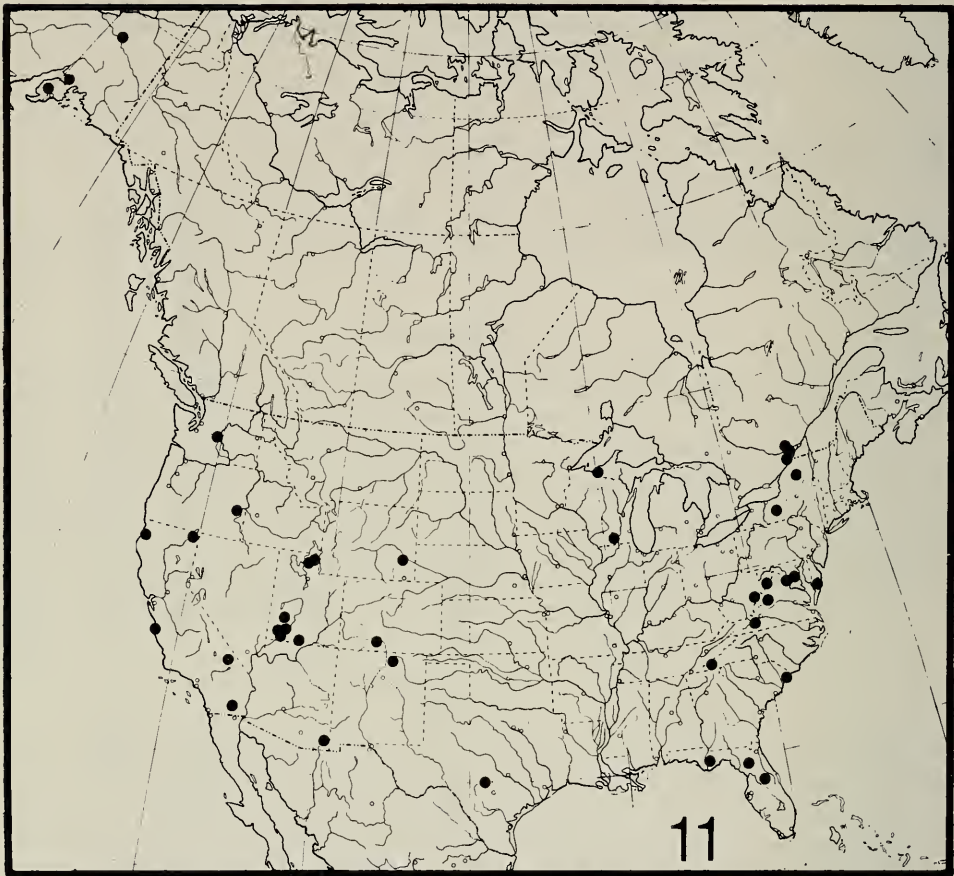


Fig. 11. Distribution of *Bezzia bivittata*.

- slender, hastate distally; parameres with broad capitate distal expansion *setosinotum* n. sp.
- Hind tibia with subapical pale ring; male basistyle with broad basal swelling with ventral cluster of long setae and shallow distomesal fold; lobes of aedeagus short and stout, blunt-tipped; parameres with apex slender but with distinct subbasal swelling *andersonorum* n. sp.
6. All femora uniformly dark brown; fore tibia pale brown, mid and hind tibiae yellowish; legs with spiny setose vestiture; mesonotum with dense fine pubescence and sparse setae *flavitibia* Dow and Turner (male)
- Legs and mesonotum otherwise 7
7. Tarsi uniformly white, at most fourth and fifth tarsomeres somewhat brownish; antenna more or less pale at base; spermathecae elongate oval; mesonotum unusually gibbous anteriorly, polished black without pollen *gibbera* (Coquillett)
- Tarsomeres 1–3 dark at apices, 4–5 uniformly brown; antenna brown at base; spermathecae and mesonotum various 8
8. Femora and tibiae saturate black, without pale bands *nigripes* n. sp.
- Femora with subapical and tibiae with subbasal and subapical pale bands, at least on fore leg 9

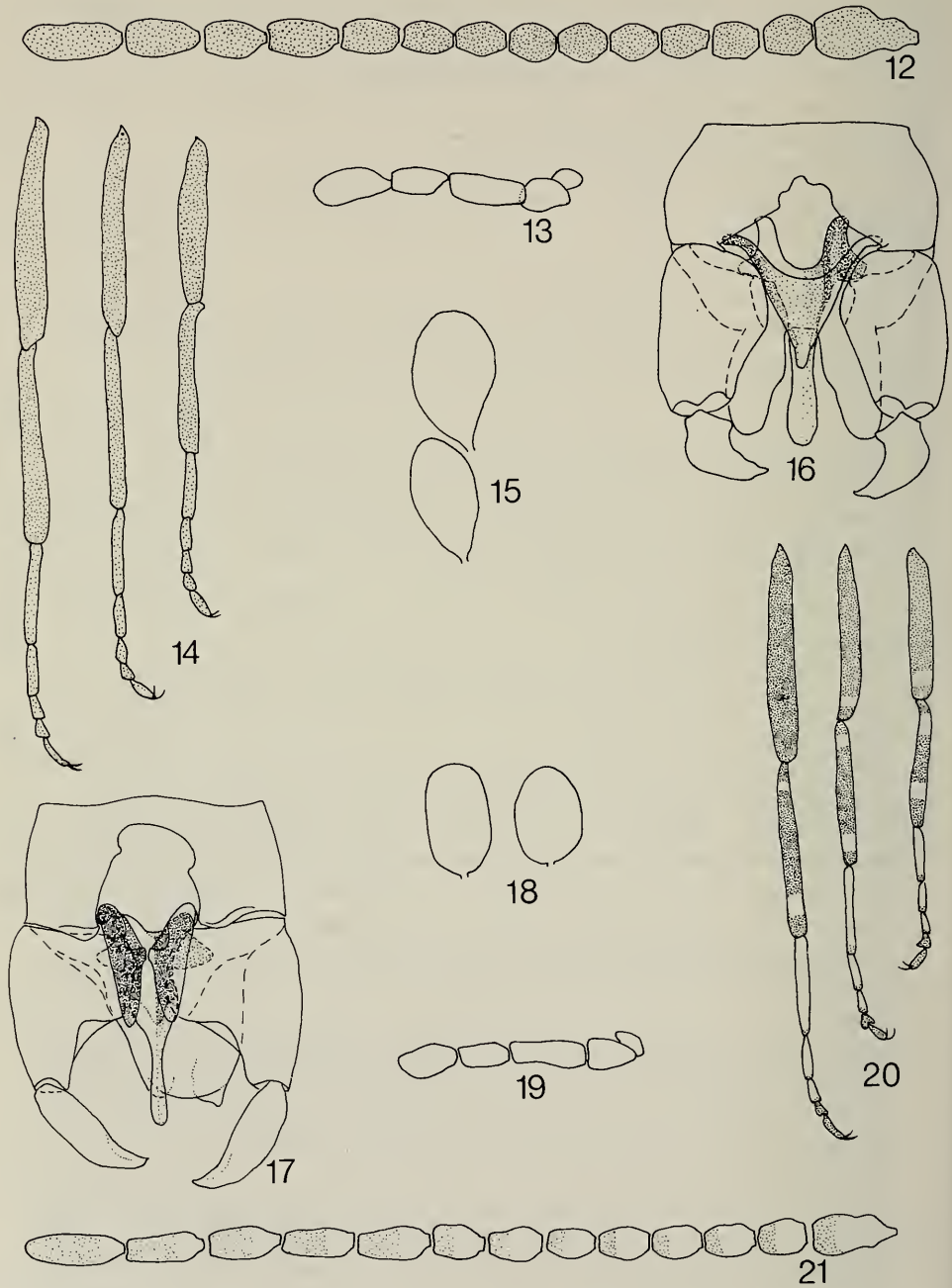
9. Color saturate black, subapical pale band on fore femur and subbasal and subapical bands on fore femur and mid tibia white, definite and strongly contrasting; female antennal segments very short 10
- Color not so black and contrasting; leg bands less distinct or absent; female antennal segments short to long 12
10. Male parameres with distal swelling or expansion 11
- Male parameres slender to tip; (female spermathecae short oval with distinct necks) *texensis* n. sp.
11. Male paramere with short, broad, spatulate distal expansion; female and mesonotal pattern unknown *capitata* n. sp.
- Male parameres with bulbous distal swelling; mesonotum with numerous pollinose white spots easily seen in anterior view of dry or fresh specimens; female spermathecae elongate oval, with short necks *sandersoni* n. sp.
12. Femora and tibiae uniformly dark brown, without pale bands; tarsi uniformly brownish; antennal segments (Fig. 12) short oval, distal five segments in female scarcely elongated, antennal ratio 0.79 (spermathecae with long tapering necks (Fig. 15); male dististyle short and stout, curved to sharp distal point (Fig. 16)) *aklavikensis* n. sp.
- Legs with pale rings; antenna with distal segments elongated, female antennal ratio 0.97–1.10 13
13. Hind tibia with distinct subbasal and subapical pale rings; femora extensively pale at bases; female with one spermatheca; male aedeagus with truncate tip *mohave* n. sp.
- Hind tibia rarely with subbasal and/or subapical pale rings; female with two large spermathecae; male aedeagus with tip slender and rounded 14
14. Spermathecae subspherical with short necks; male basistyle broad at base, tapering distally; dististyle short, stout nearly to tip; aedeagus with distal process long and tapering with straight sides .. *bivittata* (Coquillett)
- Spermathecae not as above; male basistyle globular with patch of long, mesally directed hairs or stout setae; dististyle hook-like, tapering to slender tip; distal process of aedeagus with slender point and concave sides 15
15. Mid femur with subapical pale ring; mid tibia with subbasal and subapical pale rings; female antenna shorter and stouter; spermathecae with long tapering necks; male basistyle with mesal patch of stout setae; dististyle short and stout, curved to sharp distal point (eastern U.S.) *gibberella* n. sp.
- Pale rings absent subapically on mid femur and base of mid tibia; female antenna elongate; spermathecae elongate oval with short necks; male basistyle with mesal patch of long fine hairs; dististyle elongate, slender and hook-like (Arizona) *chelistyla* n. sp.

Bezzia aklavikensis, new species

Figs. 12–16

Diagnosis.—A large species distinguished from all other species in the *bivittata* group by its unbanded, uniformly dark brown legs, short stout antenna (antennal ratio of female 0.79, of male 0.87), and large elongate ovoid spermathecae.

Allotype Female.—Wing length 1.68 mm; breadth 0.61 mm. Head: Dark brown.



Figs. 12-21. 12-16, *Bezzia aklavikensis*; 17-21, *andersonorum*; 12-15, 18-21, female; 16-17, male; 12, 21, antenna; 13, 19, palpus; 14, 20, hind, mid, and fore legs (left to right); 15, 18, spermathecae; 16, 17, genitalia.

Eyes broadly separated, a space of four ommatidial facets, a distance of 0.06 mm. Antennal flagellum (Fig. 12) brown; flagellar segments with lengths in proportion of 23-11-11-10-10-10-11-11-12-14-15-17-19; antennal ratio 0.79. Palpus (Fig. 13) brown; lengths of segments in proportion 6-10-16-12-16; palpal ratio 2.67. Mandible with 11-12 large coarse teeth.

Thorax: Dark brown. Mesonotum, scutellum and postscutellum with dense short setae and finer pubescence. Legs (Fig. 14) including tarsi uniformly dark brown. Wing hyaline, anterior veins brown, posterior veins lighter in color; costal ratio 0.68. Halter dark brown.

Abdomen: Dark brown. Spermathecae (Fig. 15) large, elongate ovoid with short necks, measuring 0.104 by 0.063 mm and 0.093 by 0.052 mm.

Holotype male.—Wing length 1.61 mm; breadth 0.46 mm. Similar to allotype female with the following differences: Antennal plume dense, dark brown; flagellar segments with lengths in proportion of 35-12-12-12-11-12-12-14-20-35-17-16-16; antennal ratio 0.87. Palpus with more slender third segment; palpal ratio 3.29. Costal ratio of wing 0.62. Genitalia as in Fig. 16. Ninth sternum slightly more than twice as broad as long, bulbous in appearance, caudomedian excavation deep, broadly V-shaped; ninth tergum tapers abruptly distally to a broad truncate margin where it joins the large divergent cerci that extend beyond the basistyles. Basistyle 1.6 times longer than broad, broadest basally, tapering slightly distally on mesal portion; dististyle about half the length of the basistyle, very short truncated in appearance, broadest basally, greatly curved and tapering abruptly distally to a broadly pointed tip. Aedeagus triangular, 1.2 times broader than long, basal arch 0.3 of total length; basal arm very heavily sclerotized, slightly recurved; distal portion more lightly sclerotized, tapering abruptly distally to a narrowly rounded, hyaline tip. Parameres heavily sclerotized on proximal portion, more lightly sclerotized on distal portion; basal arm broad and slightly recurved with a small lateral winglike lobe; distal portion broad proximally, tapering distally to broad rodlike form with bulbous rounded tip.

Distribution.—Canada; known only from the type-locality in the Northwest Territory.

Types.—Holotype male, allotype female, CANADA, NORTHWEST TERRITORY, Aklavik, 21 June 1953, C. D. Bird (deposited in CNC).

Discussion.—The specific epithet refers to the type-locality in northwest Canada where this species was taken.

The only other species with unbanded dark legs is *B. nigripes* n. sp. from Utah and California. That species differs readily from *B. aklavikensis* in having darker femora and tibiae and paler tarsi, more rounded spermathecae with long, slender necks, a more slender palpus (female palpal ratio 5.14), and smaller size (female wing length 1.27 mm).

Bezzia andersonorum, new species

Figs. 17-21

Diagnosis.—A medium-sized species most closely resembling *B. setosinotum* in having banded legs and white halter but differing from that species and all other species in the group by its short, broad, H-shaped, bipartite aedeagus,

parameres with slender distal portion, and female abdomen pale yellow with ovoid spermathecae with very short necks.

Holotype Male.—Wing length 1.15 mm; breadth 0.36 mm.

Head: Dark brown. Eyes well separated, the width of five ommatidial facets, a distance of 0.056 mm. Antennal flagellum uniformly brown; flagellar segments with lengths in proportion of 21-10-10-10-10-10-11-13-21-34-13-14-16; antennal ratio 1.04; plume dense, dark brown. Palpus with lengths of segments in proportion of 5-7-13-9-9; palpal ratio 3.25.

Thorax: Dark brown; mesonotum with moderately dense short setae and finer setae giving a pubescent appearance. Legs (Fig. 20) dark brown with banded pattern very similar to that of *B. setosinotum* (Fig. 61) except hind tibia with broad subapical pale band. Wing hyaline, veins pale but easily discernible; costal ratio 0.60. Halter white.

Abdomen: Brown. Genitalia as in Fig. 17. Ninth sternum nearly twice as broad as long, caudomedian excavation very deep, U-shaped; ninth tergum tapering rather abruptly on basal half, then more gradually on distal half, cerci very short, extending to tip of basistyle. Basistyle slightly longer than broad with a broad basal swelling with ventral cluster of long setae and a shallow distomesal fold; dististyle 0.8 the length of basistyle, broadest in mid-portion, curving and tapering on extreme distal portion to broadly pointed tip. Aedeagus very heavily sclerotized, short, broad, H-shaped, and bipartite, slightly longer than broad; basal arch to 0.45 of total length, basal arm with tip broadly rounded and recurved ventrally; distal portion joined by a slender median bridge that appears to be broken due to mounting, each portion tapering slightly distally to narrow rounded tip. Parameres very heavily sclerotized; basal arm short, slightly recurved with broad, triangular, lateral portion; distal portion constricted at base then broad on basal third and tapering abruptly on distal two-thirds to slender rounded tip.

Allotype female.—Wing length 1.10 mm; breadth 0.43. Similar to holotype male with the following differences: Antennal flagellum (Fig. 21) pale on proximal portions of flagellomeres, distal portions light brown; flagellar segments with lengths in proportion of 14-8-8-8-8-8-8-11-11-11-12-15; antennal ratio 0.86. Palpus (Fig. 19) with lengths of segments in proportion of 5-8-12-7-10; palpal ratio 2.40. Mandible with 10-12 large coarse teeth. Legs dark brown with banded pattern as figured, fore femur palest. Costal ratio 0.70. Abdomen pale yellow; two ovoid spermathecae (Fig. 18) with very short necks measuring 0.074 by 0.052 and 0.067 by 0.044 mm.

Distribution.—Maryland, North Carolina, Quebec.

Types.—Holotype male, 1 male paratype, MARYLAND, Worcester Co., Snow Hill, 19 June 1968, W. H. Anderson, light trap, from along margin of Nassawango Creek one mile upstream from its confluence with the Pocomoke River (Type no. 76584, USNM). Allotype female, QUEBEC, Rowanton Depot, 28 June 1954, J. A. Downes (CNC). Paratype, 1 female, NORTH CAROLINA, Carteret Co., 19 June 1977, M. A. Tidwell, light trap.

Discussion.—The species is named in honor of William and Jean Anderson of Snow Hill, Maryland, in appreciation of their continued interest in collecting Ceratopogonidae for us. The distinctive short, bipartite aedeagus in combination with the white halter, yellow female abdomen, and banded legs is sufficient to distinguish this species from all others in the *bivittata* Group.

Bezzia bivittata (Coquillett)

Figs. 1-11

Ceratopogon bivittatus Coquillett, 1905:60 (female; California).*Bezzia bivittata* (Coquillett):—Kieffer, 1906:58 (combination):—Wirth, 1965:141 (listed); 1952:238 (male; female redescribed; figs.; California).*Probezzia bivittata* (Coquillett):—Johannsen, 1908:267 (combination):—Malloch, 1914b:138 (in key); 1915:357 (listed):—Johannsen, 1943:785 (listed).*Bezzia* (*Aspinabezzia*) *bivittata* (Coquillett):—Dow and Turner, 1976:126 (redescribed; status; figs.; distribution).

Diagnosis.—A medium-sized to large species with dark legs banded as follows: pale bands on subapex of fore femur, subbase and subapex of fore and mid tibiae (rarely hind tibia banded); spermathecae small, spheroid with short necks, mesonotum with two short silvery longitudinal lines; male genitalia with slender aedeagus, short globose basistyles, ninth sternum with shallow caudomedian excavation, parameres with slender distal portion and well-developed bifurcate basal arms.

Female.—Wing length 1.40 (1.17–2.11, $n = 28$) mm; breadth 0.55 (0.78–0.77, $n = 27$ mm).

Head (Fig. 6): Dark brown including antenna and palpus, vertex silvery pollinose. Antenna (Fig. 1) dark in majority of specimens, occasionally with narrow bases of flagellar segments yellowish (Fig. 2); lengths of flagellar segments in proportion of 16-9-9-9-9-9-9-12-12-12-14-18; antennal ratio 1.00 (0.77–1.23, $n = 28$). Palpus (Fig. 4) with lengths of segments in proportion of 4-6-15-8-12; palpal ratio 3.24 (2.40–4.00, $n = 28$). Mandible with 8–10 large coarse teeth.

Thorax: Subshining black; anterior fourth of mesonotum with a pair of submedian silvery pollinose spots continued as lines to lateral margins, a pair of short, fine, silvery, longitudinal lines continued back from inner edge of spots after a short break to half the length of mesonotum; mesonotum and scutellum with dense long black pubescence; three black bristles above wing base; scutellum with four black marginal bristles. Legs (Fig. 8) dark brown; fore femur with subapical, and fore and mid tibiae with subbasal and subapical, narrow yellow rings; hind tibia often with faint subbasal and subapical pale rings (Fig. 7); first three tarsomeres yellow with apices narrowly dark, last two tarsomeres dark; fore femur occasionally with one strong ventral spine (Fig. 7); on hind leg, basitarsus with two rows of palisade setae, second tarsomere with one row; claws (Figs. 7–8) small with basal inner teeth. Wing (Fig. 5) grayish hyaline, anterior veins yellowish; costal ratio 0.72 (0.68–0.76, $n = 28$). Halter dark brown.

Abdomen: Subshining dark brown; one pair of gland rods as long as four segments. Genitalia as in Fig. 10. Spermathecae two (rarely one or three), subspherical with very short necks, slightly unequal, measuring 0.046 by 0.037 mm and 0.037 by 0.034 mm.

Male.—Wing length 0.84–0.124 mm. Similar to female with the following differences: Antennal flagellum (Fig. 3) brown; flagellar segments in proportion of 28-12-12-12-12-12-14-18-25-55-20-21-24; antennal ratio 1.21; plume dark brown. Costal ratio 0.62–0.67. Genitalia as in Fig. 9. Ninth sternum about twice as broad as long, hind margin slightly convex with shallow caudomedian excavation. Basistyle stout, about as long as basal breadth, base often expanded into a prominent

ventromesal lobe; dististyle as long as basistyle, stout, setose, tapering to a distal point. Aedeagus about as long as broad with low basal arch; basal arm heavily sclerotized, recurved about 60°; distomedian process tapering to moderately slender tip, sides concave in outline. Parameres heavily sclerotized; basal arm bilobed; distal portion slender, sides subparallel, tip rounded, hyaline.

Distribution (Fig. 11).—North America from Alaska to California, east to Ontario and Florida.

Types.—Described from four pinned syntypes, CALIFORNIA, Eureka, "5-6," H. S. Barber (Type no. 8353, USNM). One pinned syntype has been selected and labelled as lectotype. Two syntypes from which the diagnosis was partially made have been mounted on slides.

Specimens examined.—ALASKA: Highway Anchorage to Girdwood, 22 June 1964, K. M. Sommerman, jeep trap, 1 male. Fairbanks, June 1967, Sommerman, jeep trap, 2 females.

ARIZONA: Cochise Co., Portal, Southwest Res. Sta., 2-9 June 1972, W. W. Wirth, light trap, 4 females.

CALIFORNIA: Fresno Co., Orosi, 8 July 1947, W. W. Wirth, 1 female (CIS). Humboldt Co., Eureka, 5-6, H. S. Barber, 4 female syntypes. Imperial Co., Hot Mineral, 30 Apr 1952, J. N. Belkin, 4 males; Westmoreland, 6 Apr 1949, Wirth, 1 female (CIS). Inyo Co., Saratoga Springs, Death Valley, 30 May 1953, Belkin, 1 male, 39 females. Mono Co., Fales Hot Springs, 7 June 1948, Wirth, 1 female (CIS); Leavitt Meadow, 7200 ft, 14 Aug 1963, H. B. Leech, flight trap, 1 female (CAS); Topaz Lake, July 1948, R. Coleman, light trap, 1 female; Virginia Creek, 21 June 1916, H. G. Dyar, 3 females. Monterey Co., Arroyo Seco Ranger Sta., 1 July 1948, Wirth, light trap, 1 male, 1 female; Pebble Beach, 26 Aug 1964, R. Schoeppner, 1 male with pupal exuviae. Siskiyou Co., Hornbrook, Aug 1948, R. Coleman, light trap, 1 female (CIS); 4 mi W Weed, 14 May 1948, Wirth, 1 male (CIS). Ventura Co., Piru Canyon, 22 Apr 1948, Wirth, 1 male.

COLORADO: Rio Grande Co., Beaver Creek, 10,000 ft, 21 June 1972, Wirth, Malaise trap, 2 males, 2 females; South Fork, 8000 ft, 20 June 1972, Wirth, Malaise trap, 4 males.

FLORIDA: Alachua Co., Gainesville, Chantilly Acres, 19 Apr, 7 May 1967, F. S. Blanton, light trap, 2 females. Liberty Co., Torreya State Park, 27 Apr 1958, Blanton, light trap, 2 males; 20 May 1966, H. V. Weems, light trap, 4 males, 1 female; 22 Apr 1967, Wirth, 2 males, 20 females.

MARYLAND: Prince George's Co., Patuxent Wildlife Res. Center, May 1976, W. L. Grogan, Jr., Malaise trap, 5 males, 6 females; 17 Apr 1977, S. Navai, reared from moss on wood over stream, 1 female; 19 May 1978, Wirth, Malaise trap, 1 female. Worcester Co., Snow Hill, 1 June 1966, W. H. Anderson, light trap, 1 male, 2 females.

MICHIGAN: Cheboygan Co., Douglas Lake, 24 June 1954, R. W. Williams, 1 male. Gogebic Co., 15 June 1960, R. and K. Dreisbach, 1 female.

MONTANA: Laurel, 16 July 1917, Dyar, 1 female.

NEW BRUNSWICK: Kouchibouguac, 2-13 July 1977, J. R. Vockeroth, 4 males, 3 females; 11 July 1977, M. Iranochko, 1 male, 2 females; 9-12 July 1978, J. A. Downes, 5 females; 10 July 1978, L. Forster, 5 males, 2 females (CNC).

NEW MEXICO: Taos Co., Taos, 27 July 1968, Wirth, light trap, 14 males, 7 females.

NEW YORK: St. Lawrence Co., Cranberry Lake, swamp, 25 June 1963, Wirth, 5 males, 3 females. Tompkins Co., Ellis Hollow, 15 June 1963, C. O. Berg, light trap, 1 female.

NORTH CAROLINA: Jackson Co., Balsam, 7 July 1968, R. E. Woodruff, light trap, 1 male.

ONTARIO: Almonte, 1 July 1954, J. A. Downes, 1 female (CNC). Ottawa, Mer Bleue, 27 May 1960, Wirth, 2 females.

OREGON: Malheur Co., Little Valley sw Vale, 19 June 1963, K. Goeden, light trap, 1 male, 4 females.

QUEBEC: Chelsea, 26 May 1960, Wirth, 1 male. Rowanton Depot, 30 May, 1 June, 7 Aug 1954, J. A. Downes, 2 male, 1 female (CNC).

TEXAS: Kerr Co., Kerrville, 21 May 1954, L. J. Bottimer, light trap, 1 male.

UTAH: Beaver Co., Beaver, 14 July 1949, G. L. Knowlton, at light, 1 male. Cache Co., Logan, 1 July 1957, Knowlton, light trap, 1 female. Iron Co., Parowan, 20 June 1960, Knowlton, 1 male. Kane Co., Kanab, 21 June 1950, Knowlton, 1 female.

VIRGINIA: Alexandria, Dyke Marsh, 13 May 1958, Wirth, 1 female. Fairfax Co., Falls Church, 4 July 1950, Wirth, stream margin, 1 female. Montgomery Co., Blacksburg, Apr–June 1960, D. H. Messersmith, 1 male, 2 females.

WASHINGTON: Kittatus Co., DeRoux Forest Cpgd., 11 Aug 1971, K. Goeden and A. Gurney, light trap, 2 females.

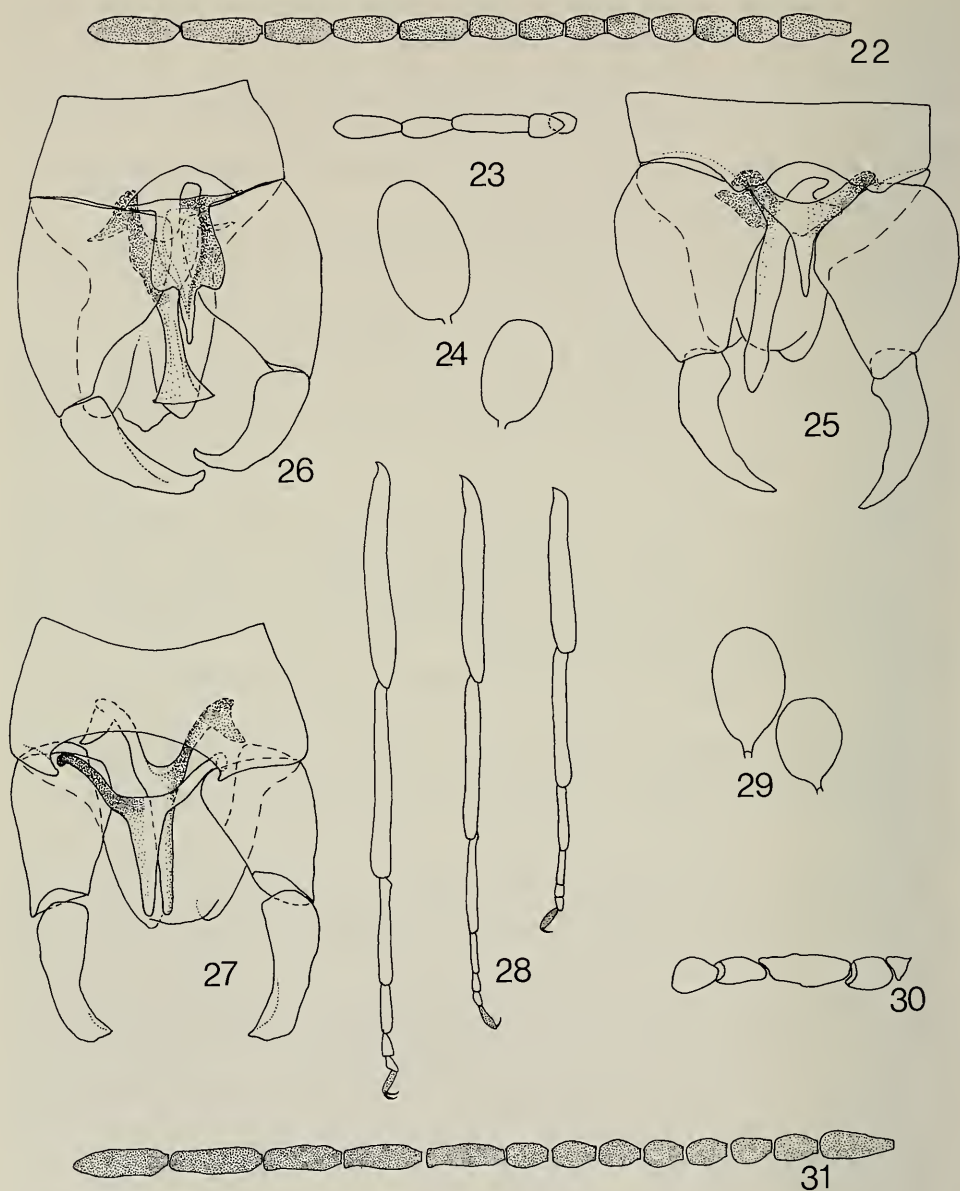
WEST VIRGINIA: Pocahontas Co., Cranberry Glades, 16 July 1955, Wirth, 1 female.

WISCONSIN: Dane Co., 30 May–7 June 1954, R. J. Dicke, light trap, 5 males, 8 females; Oregon, 25 May 1962, Wirth, light trap, 1 female.

WYOMING: Platte Co., Brown Ranch, 1 Aug 1967, M. Griffith, light trap 1 female.

Discussion.—As often seen in species with wide distribution, there is considerable variation in some characters, especially color. The syntypes, and a significant number of other specimens from the Pacific Coast states, are considerably darker, with the hind tarsus completely brown. A small number of specimens were seen with pale bands, usually indistinct, basally and subapically on the hind tibia. Occasionally one strong ventral spine occurs on the fore femur; this feature at first led to serious consideration as a specific character, but where it occurred in about a third of the specimens collected at Torreya State Park in Florida, in all instances except one it was found on one leg of a specimen and not on the other. Similar presence and absence was seen on occasional individuals from other localities.

A series of males from Kouchibouguac, New Brunswick, however, was relatively uniform in the correlation of presence of one spine on both fore femora, more distinct pale leg bands, more unequal spermathecae, shallower caudal emargination on the female eighth sternum, and more slender base of the median process of the male parameres in one set of specimens; and in another set collected at the same time and place with a contrasting set of correlated characters in the absence of femoral spine, less distinct leg markings, less unequal spermathecae, deeper caudal emargination on the female eighth sternum, and rather stout base of the median process of the male parameres. Further collections and study will be necessary to determine if *B. bivittata* is indeed a variable polytypic



Figs. 22-31. 22-25, *Bezzia chelistyla*; 26, *capitata*; 27-31, *flavitibia*; 22-24, 28-31, female; 25-27, male; 22, 31, antenna; 23, 30, palpus; 25-27, genitalia; 24, 29, spermathecae; 28, hind, mid, and fore legs (left to right).

species similar to *Culicoides variipennis* (Coquillett) or if we are dealing with a complex of very similar species that we have not learned to distinguish.

Bezzia capitata, new species

Fig. 26

Diagnosis.—A small species with banded legs and dark halter; most closely resembling *B. setosinotum* n. sp. by its parameres with broad capitate tip but differing from that species by its aedeagus with broad base and slender pointed tip.

Holotype male.—Wing length 0.86 mm; breadth 0.30 mm.

Head: Dark brown. Eyes narrowly separated, the wide of three ommatidial facets, a distance of 0.03 mm. Antennal flagellum lighter brown on basal half of segments 3–7, all of 8 and 9, proximal two-thirds of 10, and extreme bases of 11–13; flagellar segments with lengths in proportion of 16-8-8-8-8-8-9-10-12-15-11-11-11; antennal ratio 0.90. Palpus lighter brown than rest of head; lengths of segments in proportion of 4-6-8-7-7; palpal ratio 1.60.

Thorax: Dark brown; mesonotum and scutellum with dense short setae and fine pubescence. Legs dark brown with banding of femora and tibiae typical of *B. bivittata* (Fig. 8); tarsi paler than those of typical *bivittata* and more similar to those of atypical *bivittata* (Fig. 7), with only fourth and fifth tarsomeres slightly darkened. Wing hyaline, anterior veins light brown, posterior veins paler; costal ratio 0.66. Halter brown.

Abdomen: Brown. Genitalia as in Fig. 26. Ninth sternum twice as broad as long, base slightly convex, caudomedian excavation very shallow; ninth tergum tapering very abruptly distally to a constriction, then nearly parallel-sided, cerci very long and quite broad, extending beyond basistyles. Basistyle slightly curved, about 1.3 times longer than broad, very broad basally then tapering and curved distally; dististyle nearly as long as basistyle, greatly curved and tapering distally to slender pointed tip. Aedeagus heavily sclerotized only on well-defined mid-portion; basal arch absent, basal arms nearly straight, directed laterad and tapering to slender pointed tip; main body triangular in shape with flap-like lateral expansions and long slender apical process with narrow pointed tip. Parameres heavily sclerotized; basal arm recurved, broad basally, tapering to slender, doubly recurved tip; distal portion broad basally, tapering to slender rod which then expands to broad, truncate, capitate tip.

Female.—Unknown.

Distribution.—Extreme southern Arizona south to Costa Rica.

Types.—Holotype male, HONDURAS, Comayagua, Rancho Chiquito, 7 June 1964, F. S. Blanton (Type no. 76585, USNM). Two male paratypes as follows: ARIZONA: Santa Cruz Co., Pena Blanca, 10 mi w Nogales, Werner, Nutting and Johnson, light trap. COSTA RICA: Puntarenas, Palmar Sur, 5 Aug 1964, F. S. Blanton.

Discussion.—The specific name *capitata* is in reference to the capitate tip of the parameres which is similar to that of *B. setosinotum* n. sp. The distinctively shaped aedeagus of *B. capitata* is, however, sufficient to distinguish it from *setosinotum* as well as all other species in the *bivittata* Group.

Bezzia chelistyla, new species

Figs. 22–25

Diagnosis.—A medium-sized species with leg markings as in *B. bivittata* but distinguished from that species as follows: Male genitalia wing pincer-like dististyles; aedeagus short, broad with a slender pointed tip; female spermathecae large, elongate ovoid with short necks; mesonotum covered with fine pubescence only.

Allotype Female.—Wing length 1.39 mm; breadth 0.48 mm.

Head: Brown. Eyes narrowly separated, a space of two ommatidial facets, a distance of 0.026 mm. Antennal flagellum (Fig. 22) brown, lighter brown on bases of all segments; lengths of flagellar segments in proportion of 18-10-10-9-9-10-10-15-14-15-17-22; antennal ratio 0.97. Palpus (Fig. 23) brown; lengths of segments in proportion of 6-8-17-10-11; palpal ratio 4.25. Mandible with 10–12 large coarse teeth and 2–3 smaller basal teeth.

Thorax: Brown; mesonotum covered with fine pubescence only. Legs patterned as in *B. bivittata* (Fig. 8). Wing hyaline, anterior veins brown, posterior veins pale; costal ratio 0.69. Halter stem brown; knob dark brown.

Abdomen: Brown. Spermathecae (Fig. 24) large, unequal, elongate ovoid with short necks, measuring 0.070 by 0.052 mm and 0.063 by 0.044 mm.

Holotype Male.—Wing length 1.57 mm; breadth 0.44 mm. Similar to female allotype with the following differences: Antennal flagellum with proximal 7 segments indistinctly separated; lengths of flagellar segments in proportion of 27-12-12-12-12-13-13-18-30-38-16-19-25; antennal ratio 1.08; plume dark brown. Palpus with lengths of segments in proportion of 5-9-19-11-13; palpal ratio 4.75. Wing more slender with shorter radial cell; costal ratio 0.64. Genitalia as in Fig. 25. Ninth sternum over twice as broad as long, with a shallow caudomedian excavation; ninth tergum tapering abruptly distally to broad rounded tip where it joins the long cerci which extend just below the length of the basistyles. Basistyle 1.3 times longer than broad, globular, with long ventral and mesal setae; dististyle 0.83 the length of basistyle, greatly curved, and tapering distally to slender pointed tip. Aedeagus broadly triangular, slightly broader than long, basal arch low, about 0.2 of total length, basal arms heavily sclerotized, tips broadly rounded and recurved more than 90°; distal portion more lightly sclerotized, tapering distally to the long, slender, pointed tip. Parameres heavily sclerotized proximally, more lightly sclerotized distally; basal arms with broad lateral lobe and a curved posterior portion; distal portion slender, rodlike, with slender rounded tip extending just beyond basistyles.

Distribution.—Arizona.

Types.—Holotype male, allotype female, ARIZONA, Coconino Co., Fort Valley Exp. Sta., 10 mi NW Flagstaff, 9–12 July 1959, L. A. Carruth, light trap (Type no. 76586, USNM). Paratypes, 5 females, ARIZONA: Cochise Co., Portal, Southwest Res. Sta., 4 June 1967, C. W. Sabrosky, light trap, 2 females; 5–9 June 1972, W. W. Wirth, light trap, 2 females; 4 Oct 1967, V. Roth, light trap, 1 female.

Discussion.—The specific name *chelistyla* is in reference to the pincer-like or claw-like male dististyles.

Bezzia flavitibia Dow and Turner
Figs. 27–31

Bezzia flavitibia Dow and Turner, 1976:140 (male; New York; figs.).

Diagnosis.—A medium-sized species distinguished from all other species in the group by the following combination of characters: female with pale yellowish halter, legs, and abdomen, the head including antenna and thorax contrasting dark brown; male with dark brown halter, femora and abdomen, paler tibiae, and genitalia essentially the same as those of *B. bivittata*.

Female.—Wing length 1.42 (1.35–1.45, $n = 7$) mm; breadth 0.51 (0.50–0.52, $n = 7$) mm.

Head: Dark brown. Eyes narrowly separated, a space of three ommatidial facets, a distance of 0.04 mm. Antennal flagellum (Fig. 31) brown; flagellar segments with lengths in proportion of 19-10-10-9-10-10-10-16-15-16-19-23; antennal ratio 0.99 (0.96–1.08, $n = 7$). Palpus (Fig. 30) brown; lengths of segments in proportion of 6-10-17-9-10; palpal ratio 3.31 (2.89–4.25, $n = 7$). Mandible with 8 large coarse teeth and 2–3 small basal teeth.

Thorax: Dark brown; mesonotum and scutellum with sparse long setae and dense fine pubescence. Legs (Fig. 28) yellowish, femora occasionally light brownish; tarsi pale on proximal 3–4 tarsomeres, brown on distal 1–2; legs with spiny setose vestiture. Wing hyaline, veins pale; costal ratio 0.73 (0.71–0.76, $n = 7$). Halter pale.

Abdomen: Pale yellowish. Spermathecae (Fig. 29) small, unequal, ovoid to spheroid with short necks, measuring 0.059 by 0.044 mm and 0.048 by 0.035 mm.

Male.—Wing length 1.01–1.57 mm; breadth 0.38–0.45 mm. Similar to female with following differences: Antennal flagellum with dark brown plume; lengths of flagellar segments in proportion of 23-12-13-13-13-14-15-19-24-47-18-24-24; antennal ratio 1.12. Legs with dark brown femora and occasionally tibiae light brown. Wing more slender; costal ratio 0.63–0.69. Halter dark brown. Abdomen brown. Genitalia as in Fig. 27, similar to those of *B. bivittata* (Fig. 9). Dow and Turner (1976) in their original drawing illustrate a small basal lateral tooth on the basal arms of the parameres that is not present in the holotype or any other males examined.

Distribution.—New Brunswick, New York, Ontario.

Type.—Holotype male, NEW YORK, St. Lawrence Co., Cranberry Lake, 25 June 1963, W. W. Wirth (Type no. 76587, USNM).

Specimens examined.—NEW BRUNSWICK: Kouchibouguac, 2–11 July 1978, L. Forster, 11 males, 5 females (CNC).

NEW YORK: Cattaraugus Co., Allegany St. Park, 3 June 1963, W. Wirth, 3 males (paratypes). Hamilton Co., Newcomb, Hamilton-Essex, 11 May 1959, H. A. Jamnback, Berlese trap, 1 male with pupal exuviae (paratype). St. Lawrence Co., same data as holotype, 12 males (6 are paratypes), 7 females.

ONTARIO: Ottawa, Britannia Bay, 26 May 1960, Wirth, 1 male; Ottawa, Mer Bleue, 27 May 1960, Wirth, 2 males.

Discussion.—This species is distinguished by the uniformly pale tibiae; in the male by the uniformly dark brown femora, especially on the mid and hind legs;

on some males the fore tibia is somewhat brownish. The association of the female was overlooked by Dow and Turner (1976), and is based on the following: In the large collection made by Wirth in the swamp at Cranberry Lake, N.Y., seven females were found with leg markings similar to those of male *B. flavitibia*, but with pale halter, yellowish abdomen, and uniformly yellowish legs. There were 5 males and 2 females of *B. bivittata* in this collection, but these have distinctly dark legs with pale bands on femora and tibiae. The dark brown pigmentation of the *B. flavitibia* thorax is the same for males as for females from Cranberry Lake, and the palpi and antennae, allowing for sexual dimorphism, are similar in color and shape. Such distinct color dimorphism between sexes is rare but not unheard of in Ceratopogonidae. An example is seen in *Probezzia pallida* Malloch (Tribe Sphaeromiini), in which the female is uniformly pale yellowish and the male has contrasting black thorax and femora, but is otherwise pale (Wirth and Grogan 1979). There is also less striking but nevertheless distinct dimorphism between the pale female abdomen and the brownish male abdomen of *Bezzia nobilis* (Winnertz) and *B. magnisetula* Dow and Turner in the *Bezzia nobilis* Group.

Bezzia gibbera (Coquillett)

Figs. 32–35, 37

Ceratopogon gibber Coquillett, 1905:60 (female; Cuba).

Probezzia gibber (Coquillett):—Johannsen, 1908:267 (combination):—Malloch, 1914b:138 (in table); 1915:357 (noted):—Johannsen, 1943:785 (in list).

Bezzia gibber (Coquillett):—Kieffer, 1917:330 (combination).

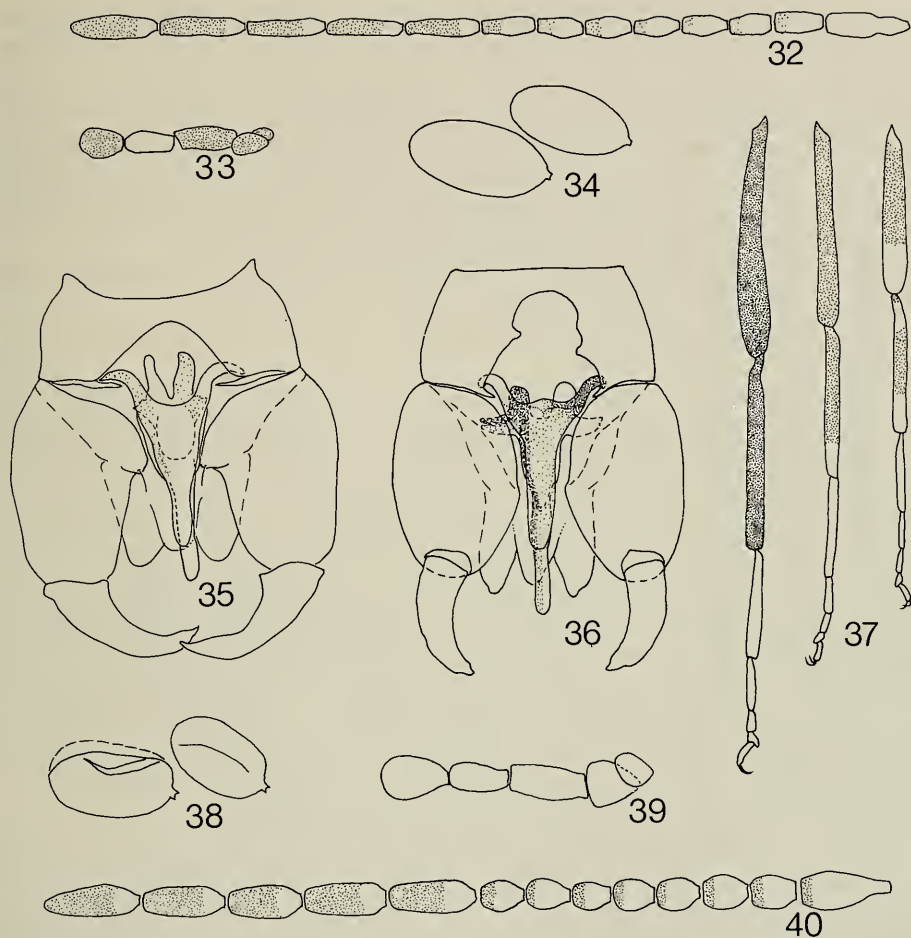
Bezzia gibbera (Coquillett):—Wirth, 1965:141 (list; distribution); 1974:53 (catalog reference).—Dow and Turner, 1976:142 (misidentification in part; female re-described; figs.; distribution).

Diagnosis.—A small species distinguished by its bright yellow antennal scape; fourth palpal segment pale, other segments brown; halter stem whitish, knob dark brown; setae on scutum arising from raised tubercles; spermathecae large, elongated, ovoid, subequal; male genitalia with setose lobe on ventromesal base of basistyle.

Female.—Wing length 1.26 (1.11–1.38, $n = 9$) mm; breadth 0.44 (0.40–0.47, $n = 9$) mm.

Head: Brown. Eyes narrowly separated, a space of 2.5 ommatidial facets, a distance of 0.03 mm. Antennal scape bright yellow, pedicel brown; flagellum (Fig. 32) yellow on first flagellar segment and proximal $\frac{1}{2}$ – $\frac{2}{3}$ of segments 4–10 and basal $\frac{1}{4}$ of distal five segments, distal portions of segments light brown; lengths of flagellar segments in proportion of 19-11-11-11-11-11-12-14-17-18-18-19-23; antennal ratio 0.85 (0.75–0.98, $n = 9$). Palpus (Fig. 33) brown, fourth segment pale; lengths of segments in proportion of 4-7-11-9-8; palpal ratio 2.36 (2.00–2.75, $n = 9$). Mandible with 10–12 large coarse teeth and 3–4 smaller basal teeth.

Thorax: dark brown; mesonotum with setae arising from raised tubercles. Legs (Fig. 37) dark brown on hind femur and tibia, lighter brown on mid femur and tibia except apex, and proximal $\frac{2}{3}$ of fore femur and broad midportion of fore tibia, yellow on apex of mid tibia, distal fourth of fore femur and base and apex of fore tibia; tarsi pale on all tarsomeres; fifth tarsomeres light brown on some



Figs. 32-40. 32-35, 37, *Bezzia gibbera*; 36, 38-40, *luteiventris*; 32-34, 37-40, female; 35-36, male: 32, 40, antenna; 33, 39, palpus; 34, 38, spermathecae; 35-36, genitalia; 37, hind, mid, and fore legs (left to right).

specimens. Wing grayish hyaline, veins brownish; costal ratio 0.72 (0.69-0.76, $n = 9$). Halter stem whitish, knob dark brown.

Abdomen: Brown. Spermathecae (Fig. 34) large, elongated ovoid with short necks; measuring 0.081 by 0.041 mm and 0.074 by 0.037 mm.

Male.—Wing length 1.15 mm; breadth 0.36 mm. Similar to female with the following differences: Antennal flagellum with lengths of flagellar segments in proportion of 22-11-11-11-11-11-11-14-20-29-14-15-20, proximal 10 flagellar segments indistinctly separated; antennal ratio 0.96; plume golden brown. Fourth palpal segment brown. Genitalia as in Fig. 35. Ninth sternum 1.8 times broader than long, caudomedian excavation deep, broadly U-shaped; ninth tergum tapering abruptly distally and becoming rounded where it joins the long, broad cerci that extend almost the length of the basistyles. Basistyle curved, base with setose

ventromesal lobe; dististyle 0.65 length of basistyle, greatly curved and tapering distally to sharply pointed tip. Aedeagus 1.2 times longer than broad; basal arch 0.20 of total length, basal arms nearly sclerotized, recurved nearly 90°; distal portion more lightly sclerotized except along margins, tapering distally to narrow rounded tip, margins with lateral flaps that extend almost entire length. Parameres heavily sclerotized proximally, more lightly sclerotized distally; basal arms with short lateral point and a longer, nearly straight posterior portion; distal portion tapering to a slender, rod-like structure with narrow rounded tip.

Distribution.—Southern Arizona, Texas and Florida south to Panama and throughout the islands of the Caribbean.

Type.—Holotype female, CUBA, Cayamas, 16 Jan, E. A. Schwartz (Type no. 8355, USNM).

Specimens examined.—ARIZONA: Maricopa Co., Wickenburg, Hassayampa River, 29 June 1953, W. W. Wirth, 1 male. Pima Co., Quitobaquito, 26 Apr 1959, M. S. Adachi, 1 female. Yavapai Co., Oak Creek at Cornville, 10 June 1977, M. W. Sanderson, light trap, 1 female. EL SALVADOR: San Vicente, Santo Domingo, Oct 1966, F. S. Blanton, light trap, 1 female. FLORIDA: Monroe Co., Big Pine Key, 7 June 1950, St. Bd. Health, light trap, 1 male. JAMAICA: Clarendon Parish, Milk River Bath, 19 Nov 1968, R. E. Woodruff, light trap, 1 female. Runaway Bay, 1–8 Mar 1970, W. W. Wirth, malaise trap, 1 female. Westmoreland Parish, Negril Beach, 10 Dec 1969, E. G. Farnworth, light trap, 1 female. MEXICO: Oaxaca, Palomares, 5–21 Sept 1961, R. and K. Dreisbach, 1 female. TEXAS: Kerr Co., Kerrville, May–Sept 1953, 1954 L. J. Bottimer, light trap, 13 males, 6 females. Llano Co., Enchanted Rock, 1–5 June 1953, W. W. Wirth, 1 female. TOBAGO: St. John Prov., Charlotteville, Hermitage River Bridge, 12–21 Mar 1979, D. Hardy and W. Rowe, Malaise trap, 1 female.

Comment.—This species is easily recognized by the bright yellow antennal scape, the pale fourth palpal segment, the gibbous mesonotum without pruinose white spots, but with setae arising from raised tubercles, and the tarsi whitish to the tips. Dow and Turner (1976) confused several species under this name. Our description is based primarily on the female from Runaway Bay, Jamaica, which agreed in external characters with the pinned holotype from Cuba. The description and figures of the hitherto unknown male are made from the series from Kerrville, Texas.

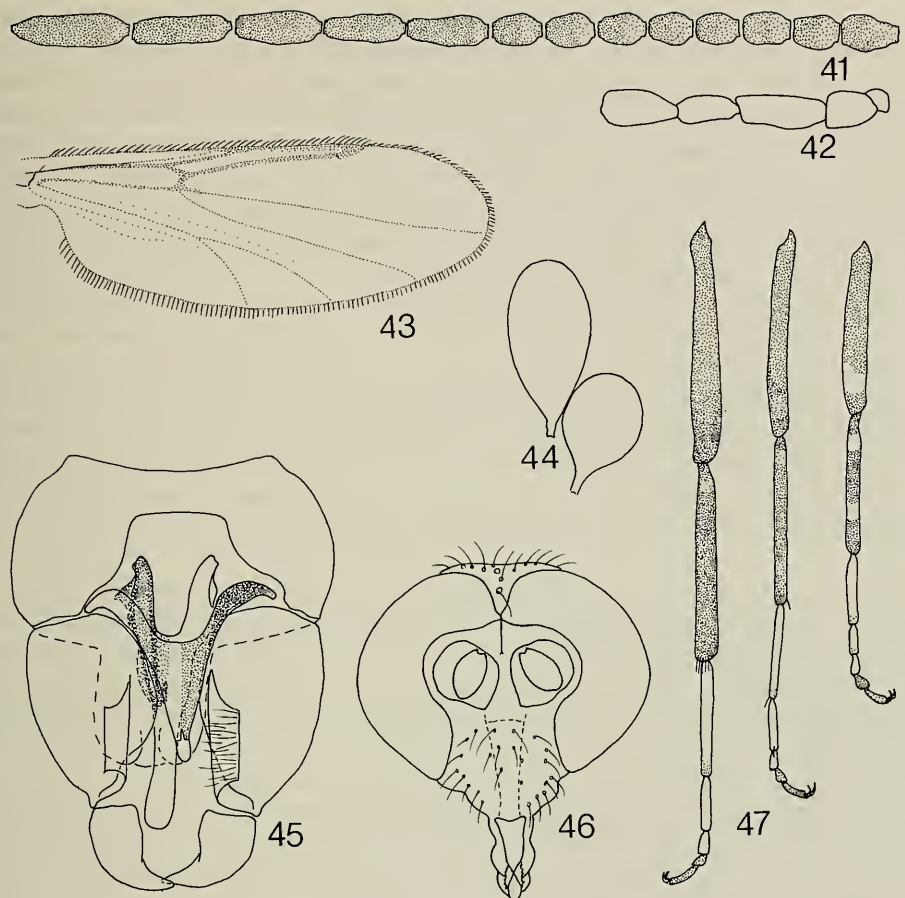
Bezzia gibberella, new species

Figs. 41–47

Diagnosis.—A medium-sized species with dark legs banded on fore leg and mid tibia as in *B. bivittata* but differing from that and all other species in the group by having the mid femur with a pale subapical, and hind tibia with a subbasal pale band; spermathecae large and ovoid, unequal with long tapering necks; male genitalia with triangular aedeagus with hyaline tip, and basistyle with dense setae on ventromesal portion.

Allotype female.—Wing length 1.18 mm; breadth 0.43 mm.

Head: Dark brown. Eyes narrowly separated, a space of two ommatidial facets, a distance of 0.027 mm. Antennal flagellum (Fig. 41) brown, lighter brown on basal half of proximal eight flagellar segments and bases of distal five segments; flagellar segments with lengths in proportion of 13-9-8-8-8-8-9-13-14-15-17-19;



Figs. 41–47. 41–47, *Bezzia gibberella*; 41–44, 46–47, female; 45, male; 41, antenna; 42, palpus; 43, wing; 44, spermathecae; 45, genitalia; 46, head, anterior view; 47, hind, mid, and fore legs (left to right).

antennal ratio 1.10. Palpus (Fig. 42) brown, slender; lengths of segments in proportion of 4-7-13-8-9; palpal ratio 3.25. Mandible with 7–8 large coarse teeth and 2–3 smaller basal ones.

Thorax: Dark brown. Mesonotum and scutellum with short dense setae and shorter pubescence; postscutellum with dense pubescence, the setae more or less in linear groups of 3 or 4. Legs (Fig. 47) dark brown with pale banding on fore leg and mid tibia typical of *B. bivittata* (Fig. 8), mid femur with pale subapical and hind tibia with pale subbasal band; tarsi pale on most of proximal three tarsomeres, distal two tarsomeres brown. Wing (Fig. 43) hyaline, veins brown; costal ratio 0.73. Halter dark brown.

Abdomen: Dark brown, terga darkest. Spermathecae (Fig. 44) large, ovoid; unequal, the larger elongated; with tapering long necks; measuring 0.110 by 0.054 mm and 0.074 by 0.044 mm.

Holotype male.—Wing length 1.14 mm; breadth not measurable due to folding. Similar to female with following differences: Antennal flagellum more uniformly

brown on proximal 8 flagellar segments, segment 9 pale; flagellar segments with lengths in proportion of 21-10-10-10-10-10-10-13-19-35-15-18-22; antennal ratio 1.16. Palpus with third segment more slender; palpal ratio 4.29. Costal ratio of wing 0.64. Genitalia as in Fig. 45. Ninth sternum nearly twice as broad as long, caudomedian excavation very deep, quadrately U-shaped; ninth tergum very short due to abrupt tapering distally to where it joins the long broad cerci which extend much less caudad than the basistyles. Basistyle slightly longer than broad, greatly swollen on mesal side basally, then tapering abruptly on mesal side; ventromesal area with long setae directed mesad, distomesal area folded with shorter finer setae; dististyle 0.67 the length of basistyle, broadest and straightest basally, then tapering and greatly curved distally to point tip. Aedeagus triangular, as broad as long, basal arch to 0.27 of total length; basal arms very heavily sclerotized, recurved more than 90°, tapering to narrow pointed tip; distal portion more lightly sclerotized, tapering gradually distally a narrowly rounded, hyaline tip. Parameres heavily sclerotized on proximal half, distal half more lightly sclerotized; basal arm straight with slightly curved, truncate tip and a small lateral lobe; distal portion broad proximally, then tapering distally to a more or less bulbous, rounded tip.

Variation.—Female wing length 1.30 (1.18–1.41, $n = 4$) mm; breadth 0.47 (0.43–0.53, $n = 4$) mm. Antennal ratio 1.03 (0.95–1.10, $n = 4$). Palpal ratio 3.01 (2.89–3.25, $n = 3$). Costal ratio 0.72 (0.71–0.73, $n = 6$). There is considerable variation in the shape of the spermathecae in the type series. Specimens varied from the typical spermathecae figured for the allotype to more quadrate spermathecae with short, more abrupt necks.

Distribution.—Maryland to Michigan and Quebec, south to Florida.

Types.—Holotype male, MARYLAND, Prince George's Co., Patuxent Wildlife Res. Center, 29 July 1978, W. W. Wirth, Malaise trap (Type no. 76588, USNM). Allotype female, same data as holotype except taken 30 May 1978; 1 female paratopotype taken 8 June 1979; 3 female paratopotypes taken June 1976 by W. L. Grogan, Jr. Five male and 3 female paratypes as follows: FLORIDA: Alachua Co., Gainesville, Chantilly Acres, 10 May–1 Nov 1967, F. S. Blanton, 2 males, 1 female. MICHIGAN: Cheboygan Co., Douglas Lake, 24, 29 June 1954, R. W. Williams, 1 male, 1 female. QUEBEC: Rowanton Depot, 6–7 July 1954, J. A. Downes, 2 males (CNC). VIRGINIA: Alexandria, 25 May 1952, Wirth, Osmunda bog, 1 female.

Discussion.—The species takes its name from its superficial resemblance to *Bezzia gibbera* (Coquillett). It differs from all other species in the *bivittata* Group in having narrow pale bands on each side of the mid knees, and spermathecae with long tapering necks. The male genitalia are distinguished by the conspicuous patch of long stout setae on the mesal face of the basistyle, and the unusually broad and deep, quadrate excavation on the ninth sternum.

Bezzia luteiventris, new species

Figs. 36, 38–40

Diagnosis.—A small species most closely resembling *B. flavitibia* Dow and Turner in its dark brown femora with contrasting yellow tibiae and pale abdomen and halter, but differing from that species as follows: Size smaller, female wing 1.05–1.11 mm (1.35–1.45 mm for *B. flavitibia*); tip of female abdomen brown;

spermathecae larger, more quadrately ovoid; antennal flagellum distinctly banded; male genitalia with deep caudomedian excavation on ninth sternum.

Holotype female.—Wing length 1.08 mm; breadth 0.39 mm.

Head: Dark brown. Eyes narrowly separated, a space of three ommatidial facets, a distance of 0.037 mm. Antennal flagellum (Fig. 40) pale on proximal $\frac{3}{4}$ of each of proximal eight segments and proximal $\frac{1}{4}$ of distal five segments; light brown on distal portions of all segments giving flagellum a distinctly banded appearance; lengths of flagellar segments in proportion of 16-9-9-8-8-8-8-12-13-13-14-14; antennal ratio 0.89. Palpus (Fig. 39) light brown; lengths of segments in proportion of 4-7-10-7-9; palpal ratio 2.22. Mandible with 7-8 large coarse teeth and 2-3 smaller basal teeth.

Thorax: Dark brown; mesonotum and scutellum covered with scattered setae and fine pubescence. Legs dark brown on femora; tibiae and proximal four tarsomeres pale yellow, 5th tarsomeres brown. Wing hyaline, veins pale; costal ratio 0.70. Halter knob pale yellow.

Abdomen: Bright yellow; brown on distal three segments, particularly so on eighth sternum. Spermathecae (Fig. 38) large; quadrately ovoid, measuring 0.078 by 0.041 mm and 0.067 by 0.041 mm.

Allotype male.—Wing length 1.04 mm; breadth 0.30 mm. Similar to female with the following differences: Antennal plume brown (distal three segments damaged so that flagellar proportions and antennal ratio could not be determined; proportions in a paratype are 27-10-11-11-11-11-12-15-20-35-16-19-23; antennal ratio 1.05). Wing more slender with shorter radial cell; costal ratio 0.61. Abdomen brown. Genitalia as in Fig. 36. Ninth sternum 1.7 times broader than long, caudomedian excavation very deep, in shape of a broad U; ninth tergum tapering abruptly distally on extreme base, then more gradually and becoming rounded where it joins the long, slender, divergent cerci, which extend just beyond basistyles. Basistyle 1.6 times longer than broad, mesal surface covered with sparse long setae; dististyle 0.65 as long as basistyle, curved and gradually tapering distally to broadly pointed tip. Aedeagus 1.3 times longer than broad, basal arch shallow, 0.17 of total length; basal arms very heavily sclerotized, distal portion more lightly sclerotized, slender, rod-like with rounded tip. Parameres very heavily sclerotized; basal arms with wing-like lateral process and posterior extension; distal portion slightly broader proximally, then more slender and rod-like distally to the rounded tip that extends beyond basistyles.

Distribution.—Virginia.

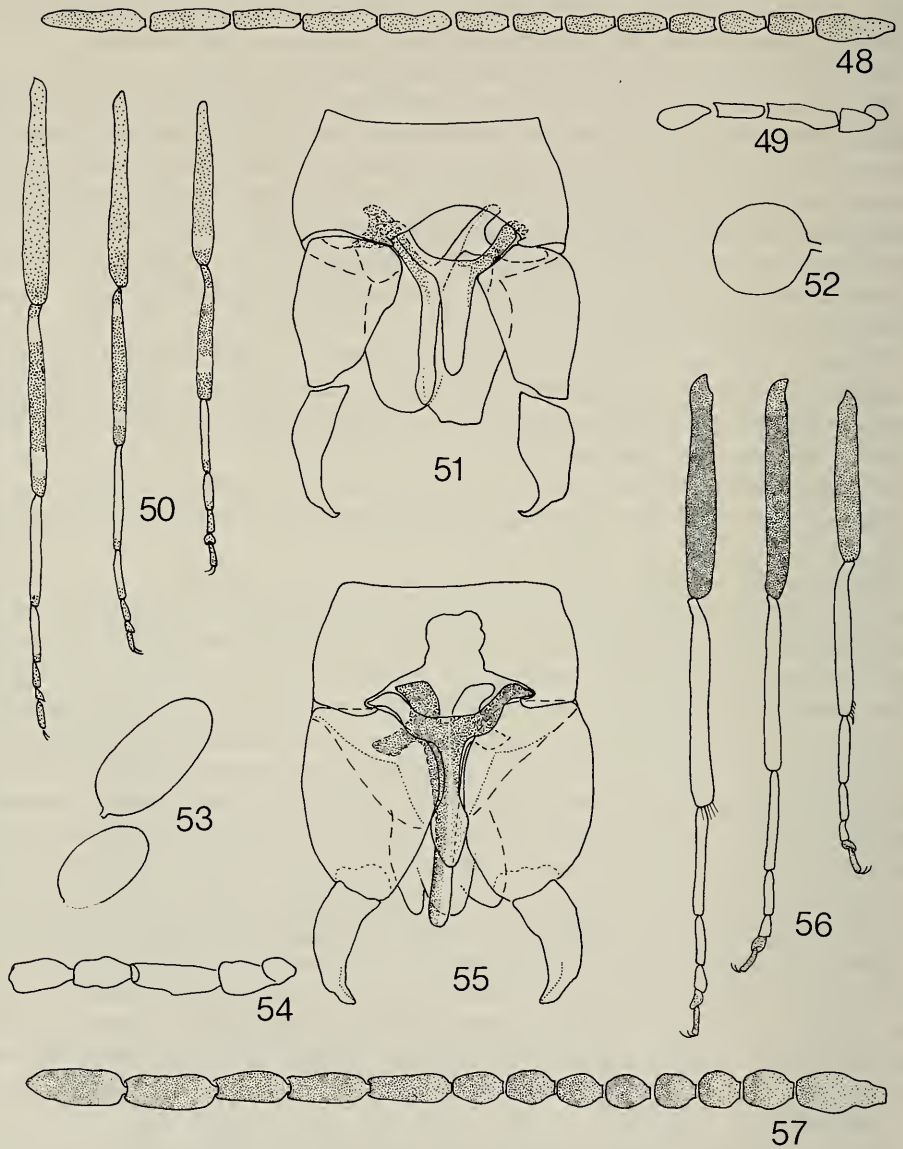
Types.—Holotype female, allotype male, 2 male, 2 female paratypes, VIRGINIA, Alexandria, reared from pupae from *Osmunda* bog, 6-30 June 1951, W. W. Wirth (Type no. 76589, USNM).

Discussion.—The specific epithet is a reference to the yellow abdomen and tibiae which serve to distinguish this distinctly marked species from all other species in the *bivittata* Group except *B. flavitibia*. That species can be distinguished by the characters outlined in the diagnosis.

Bezzia mohave, new species

Figs. 48-52

Diagnosis.—A large species with all tibiae with distinct subbasal and subapical bands but differing from all other species in the *bivittata* Group in that the female



Figs. 48-57. 48-52, *Bezzia mohave*; 53-57, *spathula*; 48-50, 52-54, 56-57, female; 51, 55, male; 48, 57, antenna; 49, 54, palpus; 51, 55, genitalia; 52-53, spermathecae; 56, hind, mid, and fore legs (left to right).

possesses only a single spermatheca and the femora are paler than tibiae distally becoming palest proximally; the male resembles the female with genitalia nearly identical to those of *B. bivittata*.

Holotype female.—Wing length 1.64 mm; breadth 0.57.

Head: Brown. Eyes narrowly separated, the space of one ommatidial facet, a distance of 0.015 mm. Antennal flagellum (Fig. 48) very light brown on proximal portions of flagellomeres, slightly darker on distal portions; flagellomeres with

lengths in proportion of 21-12-11-11-12-12-12-12-16-16-14-17-21; antennal ratio 0.82. Palpus (Fig. 49) brown, slender; lengths of segments in proportion 13-10-18-9-5; palpal ratio 3.60. Mandible with 8 large coarse teeth and 4-5 smaller basal teeth.

Thorax: Dark brown. Mesonotum and scutellum with short dense setae and finer pubescence; postscutellum with shorter setae. Legs (Fig. 50) with light brown femora proximally becoming slightly darker distally; fore femur with a pale subapical band; tibiae darker brown with distinct subbasal and subapical light bands; tarsomeres 4 and 5 of tarsi pale except darker on extreme apical portions, distal 3 tarsomeres brown. Wing hyaline, anterior veins light brown, posterior veins pale; costal ratio 0.71. Halter brown.

Abdomen: Brown. A single spheroid spermatheca with short neck measuring 0.059 by 0.048 mm (Fig. 52).

Allotype male.—Wing length 1.54 mm; breadth 0.43. Similar to holotype female with the following differences: Antennal flagellum with dense, light brown plume; flagellomeres with lengths in proportion of 28-13-13-13-13-13-15-19-29-46-18-18-24; antennal ratio 1.06. Palpus with more slender third segment; palpal ratio 4.75. Genitalia as in Fig. 51. Ninth sternum twice as broad as long, with a shallow caudomedian excavation; ninth tergum very short due to abrupt tapering distally to a broadly rounded tip where it joins the long, broad cerci which extend slightly beyond basistyles. Basistyle 1.4 times longer than broad, broadest basally tapering distally; dististyle 0.7 the length of basistyle, broadest subbasally, tapering and curved on distal half to a slender pointed tip. Aedeagus slightly longer than broad, basal arch 0.3 of total length; basal arm heavily sclerotized, recurved slightly more than 90°; distal portion lightly sclerotized, tapering slightly distally to a rounded tip. Parameres heavily sclerotized on proximal portion, distal portion lightly sclerotized; basal arm bilobed as in *B. bivittata* (Fig. 9); distal portion broad basally then becoming slender with a round tip.

Distribution.—California; known only from the Mojave Desert in Riverside County.

Types.—Holotype female, CALIFORNIA, Riverside Co., Whitewater Canyon, 6 Apr 1949, W. W. Wirth, at light (Type no. 76598, USNM). Allotype male, CALIFORNIA, Riverside Co., Thousand Palms, Willis Palms Oasis, 5 Apr 1955, W. R. Richards (CNC). Paratype, 1 female, CALIFORNIA, Riverside Co., Thousand Palms, 20 Feb 1955, W. R. Richards (CNC).

Discussion.—The specific epithet is in reference to the Mojave Desert, the only known habitat of this species.

The presence of a single spermatheca easily distinguishes this species from all other species in the *bivittata* Group with banded legs.

Bezzia nigripes, new species
Figs. 64-67

Diagnosis.—A medium-sized species distinguished by its slender legs with dark, unbanded femora and tibiae; spermathecae large, ovoid, subequal, with long slender necks; palpus slender, third segment very slender (female palpal ratio 5.14).

Holotype female.—Wing length 1.27 mm; breadth 0.46 mm.

Head: Dark brown. Eyes broadly separated, a space of about five ommatidial facets, a distance of 0.074 mm. Antennal flagellum slightly lighter in shade on

extreme bases of distal five segments flagellar segments with lengths in proportion of 19-9-9-9-9-9-8-9-11-12-13-13-18; antennal ratio 0.83. Palpus (Fig. 66) slender; segments with lengths in proportion of 6-10-18-10-13; palpal ratio 5.14. Mandible with eight large teeth and three shorter basal ones.

Thorax: Dark brown. Mesonotum with scattered short setae, but not pubescent. Legs (Fig. 67) slender with unbanded, dark brown femora and tibiae; tarsi dark on apices of tarsomeres 1 and 2, most of 3 and all of 4 and 5. Wing hyaline, anterior veins light brown, posterior veins pale; costal ratio 0.70. Halter dark brown.

Abdomen: Brown, pleura darkest. Genitalia very similar to those of *B. vittata* (Fig. 10). Spermathecae (Fig. 64) large, ovoid with long slender parallel-sided necks; subequal, measuring 0.096 by 0.056 mm and 0.078 by 0.052 mm.

Allotype male.—Wing length 1.35 mm; breadth 0.37 mm. Similar to holotype female with the following differences: Antennal flagellum uniformly brown in color, plume dense, dark brown; flagellar segments with lengths in proportion of 28-11-11-11-10-11-12-15-26-47-15-15-18; antennal ratio 1.09. Palpus with third segment shorter, palpal ratio 3.56. Mesonotum without long setae but with two lengths of relatively dense pubescence. Legs with very faint subbasal band on fore tibia; hind tarsus entirely brown and mid tarsus more suffused with brown. Genitalia as in Fig. 65, very similar to those of *B. bivittata* (Fig. 9) but differing essentially as follows: Aedeagus without well-defined, heavily sclerotized, basal portion; parameres broader across basal arms.

Distribution.—Utah and California.

Types.—Holotype female, UTAH, Washington Co., Leeds, Red Cliffs Recreation Area, 22 May 1974, W. L. Grogan, Jr., swept from margin of small stream. Allotype male, 2 male paratypes, CALIFORNIA, Imperial Co., Hot Mineral, 30 Apr 1952, J. N. Belkin (Type no. 76590, USNM).

Discussion.—The specific epithet *nigripes*, is a reference to the unbanded, dark brown femora and tibiae which are sufficient to distinguish this species from all other species in the *bivittata* Group.

Bezzia sandersoni, new species

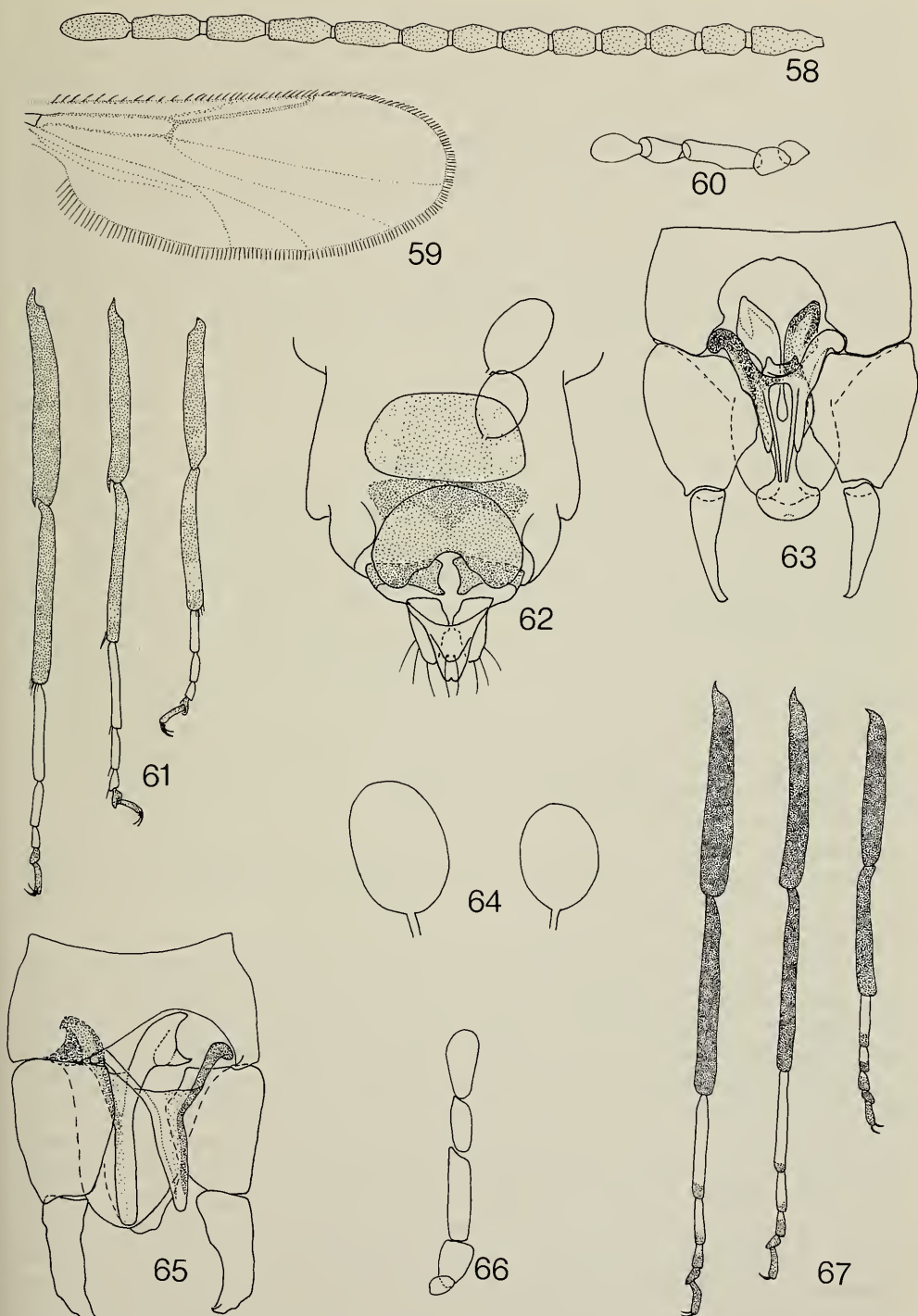
Figs. 68–71, 73

Diagnosis.—A small species distinguished by its vivid, contrasting pale bands on the fore and mid femora and tibiae; female antennal flagellum very short, distal segments moniliform to short ovoid (antennal ratio 0.71–0.87); spermathecae large, elongate ovoid; male genitalia with deeply emarginate 9th sternum and bulbous tip of parameres.

Allotype female.—Wing length 1.05 mm; breadth 0.47 mm.

Head: Dark brown. Eyes barely contiguous, joined at midline for the space of one antennal facet. Antennal flagellum (Fig. 68) brown, lighter in color on basal portions of flagellar segments, darker on apical portions; distal five segments very short, ovoid; lengths of flagellar segments in proportion of 15-8-8-8-7-7-7-8-9-9-10-13; antennal ratio 0.74. Palpus (Fig. 69) light brown, lengths of segments in proportion of 4-8-11-8-8; palpal ratio 2.75. Mandible with eight large coarse teeth and 5–6 smaller basal teeth.

Thorax: Dark brown; mesonotum and scutellum covered with short setae and



Figs. 58–67. 58–63, *Bezzia setosinotum*; 64–67, *nigripes*; 58–62, 64, 66–67, female; 71–72, male: 58, antenna; 59, wing; 60, 66, palpus; 61–67, hind, mid, and fore legs (left to right), 62, 63, 65, genitalia; 64, spermathecae.

fine pubescence. Legs (Fig. 73) dark brown on femora and tibiae, pale bands on subapices of fore and mid femora, subbases of all tibiae, and subapices of fore and mid tibiae; tarsi brown on tarsomeres 4 and 5 and apices of 1-3, pale on remainder of 1-3. Wing grayish hyaline, veins light brown; costal ratio 0.69. Halter stem light brown, knob dark brown.

Abdomen: Dark brown, pleura purplish. Spermathecae (Fig. 70) large, elongate ovoid with short necks; unequal, measuring 0.081 by 0.037 mm and 0.063 by 0.033 mm.

Holotype male.—Wing length 0.98 mm; breadth 0.36 mm. Similar to female with the following differences: Antennal flagellum pale on basal halves of segments 3-10, plume golden brown; lengths of segments in proportion of 19-10-9-10-10-11-11-11-16-19-11-12-15; antennal ratio 0.81. Wing more slender with shorter radial cell; costal ratio 0.64. Genitalia as in Fig. 71. Ninth sternum twice as broad as long, caudomedian excavation deep, broadly U-shaped; ninth tergum tapering abruptly and becoming broadly rounded where it joins the long slender cerci which extend to the apices of the basistyles. Basistyle bulbous, slightly longer than broad, ventral and mesal surface with a few long setae; dististyle as long as basistyle, curved and tapering slightly distally to truncate tip. Aedeagus triangular, 1.1 times longer than broad, basal arch 0.25 of total length; basal arms heavily sclerotized, tapering to recurved, pointed tip; distal portion more lightly sclerotized except for margins, tapering at extreme distal end to slender pointed tip, apex of which is hyaline. Parameres heavily sclerotized; basal arm with broad wing-like lateral extension and rounded posterior portion; distal portion slender, rod-like, tip bulbous.

Variation.—Wing length 1.04 (0.95-1.24, $n = 10$) mm; breadth 0.46 (0.41-0.56, $n = 10$) mm. Antennal ratio 0.77 (0.71-0.87, $n = 10$). Palpal ratio 2.36 (2.00-3.25, $n = 10$). Costal ratio 0.69 (0.65-0.71, $n = 10$).

Distribution.—Southwestern Utah through Arizona and New Mexico and east to Kansas.

Types.—Holotype male, allotype female, ARIZONA, Coconino Co., Manzanita Forest Camp, 6 July 1977, M. W. Sanderson, light trap (Type no. 76591, USNM). Paratypes, 27 males, 28 females, as follows:

ARIZONA: Cochise Co., Portal, Southwest Res. Sta., May-June 1967, C. W. Sabrosky, light trap, 4 males; 5-9 June 1973, W. W. Wirth, light trap, 1 male. Coconino Co., Mormon Lake Village, 26 June 1978, M. W. Sanderson, 3 males, 3 females; Oak Creek Canyon, 25 June 1959, W. L. Nutting, light trap, 1 male, 6 females; 22 July 1959, C. W. O'Brien, light trap, 1 female; Oak Creek, Bootlegger Campground, 13 July 1978, Sanderson, 2 males; Oak Creek at Chavez Crossing, 20 July 1977, 14 June 1978, Sanderson, 1 male, 2 females; Oak Creek, Encinoso Picnic Ground, 3 Aug 1977, Sanderson; Oak Creek at Grasshopper Point, 12 June 1977, 27 Aug 1978, Sanderson, 6 males, 3 females; Oak Creek at East Fork, 19 July 1979, Sanderson, 1 male; Manzanita Forest Camp, 6 Aug 1977, 7 July 1978, Sanderson, 2 males, 3 females. Santa Cruz Co., Ruby, Sycamore Canyon, 22 May 1954, G. D. Butler, light trap, 1 female. Yavapai Co., Oak Creek at the following points: Baldwin Crossing, Deer Pass Crossing, Josephine Tunnel, Oak Creek Village, Page Springs, Red Rock Crossing Verde River, May-Sept 1977-82, Sanderson, at light, 4 males, 6 females.

KANSAS: Riley Co., May 1964, N. Marston, Malaise trap, 1 female.

NEW MEXICO: Catron Co., 5 mi E Glenwood, 24 June 1953, W. W. Wirth, at light, 1 male, 1 female.

UTAH: Washington Co., Leeds, Red Cliffs Rec. Area, 22 May 1974, W. L. Grogan, Jr., near stream, 1 female.

Discussion.—This species is named for Milton W. Sanderson in appreciation of his interest and cooperation in collecting and sending us extensive biting midge collections from Oak Creek Canyon, Arizona.

Bezzia sandersoni resembles *B. gibbera* in its large elongate oval spermathecae, but differs in its dull mesonotum with numerous pollinose white spots and setae not arising from tubercles, its black legs with strongly contrasting pale rings, apically dark tarsi, entirely black halter, the extremely short antenna, bulbous basistyles without setose basal lobe, and parameres with bulbous tip.

Bezzia setosinotum, new species

Figs. 58–63

Diagnosis.—A medium-sized species with legs banded typically as in *B. bivittata*, but differing from that and all other species in the group by the following combination of characters: halter white; female antenna short (mean antennal ratio 0.86); female abdomen light brown to yellowish with large, elongate-ovoid spermathecae with short slender necks; male genitalia with broadly rounded tip of parameres and bifurcate aedeagus.

Allotype female.—Wing length 1.23 mm; breadth 0.47 mm.

Head: Dark brown. Eyes well separated, a space of about four ommatidial facets, a distance of 0.044 mm. Antennal flagellum (Fig. 58) lighter brown than head, flagellar segments paler proximally on basal portion, getting progressively darker overall distally the distal-most segment darkest; flagellar segments with lengths in proportion of 15-10-9-9-9-10-9-12-14-13-14-16; antennal ratio 0.86. Palpus (Fig. 60) light brown, moderately slender; lengths of segments in proportion of 5-9-15-8-9; palpal ratio 3.75. Mandible with eight large teeth and 3–4 smaller basal teeth.

Thorax: Dark brown; mesonotum and scutellum with numerous short scattered setae; mesonotum not pubescent, but scutellum and postscutellum with fine pubescence. Legs (Fig. 61) with dark brown femora, and tibiae with banding typical of *B. bivittata*, tarsi pale on proximal three tarsomeres, distal two tarsomeres brown. Wing (Fig. 59) hyaline, veins light brown; costal ratio 0.67. Halter white.

Abdomen: Light brown. Genitalia as in Fig. 62, Seventh sternum lightly sclerotized with long setae on distal half. Eighth sternum heavily sclerotized on proximal third with a shallow caudal notch, covered with long setae. Ninth sternum heavily sclerotized, each arm broadly bifurcate. Tenth sternum with five pairs of long setae. Spermathecae large, ovoid, elongate, subequal, quadrate with short, slender necks, measuring 0.089 by 0.052 mm and 0.070 by 0.048 mm.

Holotype male.—Wing length 1.24 mm, breadth 0.37 mm. Similar to female with the following differences: Antennal flagellum more uniformly dark brown; plume dense, dark brown; flagellar segments with lengths in proportion of 29-15-11-11-10-11-12-14-21-30-17-18-22; antennal ratio 1.10. Palpal ratio 3.56. Wing more slender with shorter radial cell; costal ratio 0.60. Abdomen slightly darker brown. Genitalia as in Fig. 63. Ninth sternum 1.7 times broader than long, caudomedian

excavation very deep, U-shaped; ninth tergum tapering very abruptly distally into conical shape to where it joins the short broad cerci which extend to tip of basistyles. Basistyle 1.4 times longer than broad, nearly globose, swollen basally on mesal side then tapering rather abruptly on that side, ventral surface covered with numerous long setae directed mesally; dististyle 0.7 length of basistyle nearly straight, tapering gradually distally to curved, broadly pointed tip. Aedeagus H-shaped; basal arms very heavily sclerotized, broadly rounded; distal portion bifurcate and joined by a slender bridge, heavily sclerotized basally, becoming more lightly sclerotized distally, a slender apical process arising at bridge and tapering distally to narrow tip that extends to ends of basistyles. Parameres heavily sclerotized proximally, more lightly sclerotized distally; basal arms broad, hastate in shape, becoming constricted at base distal portion broad and bulbous basally, then tapering distally before rapidly expanding to the broadly rounded, capitate tip.

Variation.—Female wing length 1.22 (0.95–1.33, $n = 10$) mm; breadth 0.44 (0.36–0.48, $n = 10$) mm. Antennal ratio 0.86 (0.82–0.98, $n = 9$). Palpal ratio 2.87 (2.60–3.75, $n = 9$). Costal ratio 0.69 (0.67–0.72, $n = 10$). There is considerable variation in the type-series in the color of the female abdomen, varying from light brown to pale yellowish, but in all specimens, even the palest ones, the genitalia are well sclerotized.

Distribution.—New Jersey south to Florida.

Types.—Holotype male, allotype female, 9 male and 17 female paratopotypes, MARYLAND: Prince George's Co., Patuxent Wildlife Res. Center, June 1976, W. L. Grogan, Jr., Malaise trap (Type no. 76592, USNM). Eight male and three female paratypes as follows:

FLORIDA: Alachua Co., Gainesville, Chantilly Acres, 8 May 1967, F. S. Blanton, 1 male.

MARYLAND: Wicomico Co., Salisbury, 20–30 June 1981, Grogan and E. Y. Nichols, Malaise trap, 6 males, 1 female.

NEW JERSEY: Middlesex Co., 11 July 1958, W. W. Wirth, light trap, 1 male.

WEST VIRGINIA: Pocahontas Co., Cranberry Glades 15 July 1955, C. W. Sabrosky, 1 female.

Discussion.—The specific name *setosinotum* is in reference to the short, abundant, stiff, spine-like setae present on the mesonotum and scutellum. It and *B. andersonorum* n. sp. are unique among members of the *bivittata* group in having typically banded legs but white halteres. Males of *B. andersonorum* have a short H-shaped but bipartite aedeagus, and the apex of the distal process of the parameres is slender.

Bezzia spathula, new species

Figs. 53–57

Diagnosis.—A small species most closely resembling *B. luteiventris* in its dark brown femora with contrasting pale yellow tibiae and abdomen, and white halter, but differing from that species as follows: male aedeagus with tip broad and spatula-shaped and basal arms broader; size larger, female wing length 1.23–1.24 mm (1.05–1.11 mm for *B. luteiventris*); female antennal ratio 1.06–1.10 (0.89 for *B. luteiventris*); female antennal flagellum indistinctly banded.

Allotype female.—Wing length 1.23 mm; breadth 0.44 mm.

Head: Dark brown. Eyes narrowly separated, a space of one ommatidial facet, a distance of 0.019 mm. Antenna with flagellum (Fig. 57) brown, paler on proximal 0.75 of proximal segments decreasing to proximal 0.25 on distal segments, thus giving flagellum an indistinctly banded appearance; lengths of flagellar segments in proportion of 19-10-8-8-9-9-9-9-21-16-14-17-18; antennal ratio 1.06. Palpus (Fig. 54) light brown, base of third segment darker, lengths of segments in proportion of 5-9-14-8-10; palpal ratio 2.80. Mandible with 7-9 large coarse teeth and 2-3 smaller basal teeth.

Thorax: Dark brown; mesonotum and scutellum covered with numerous scattered setae and fine pubescence. Legs (Fig. 56) dark brown on femora; tibiae, and proximal three tarsomeres pale yellow, distal two tarsomeres light brown. Wing hyaline, veins pale; costal ratio 0.71. Halter stem pale, knob white.

Abdomen: Pale yellow; brown on distal four segments. Spermathecae (Fig. 53) large, elongate oval; unequal, measuring 0.085 by 0.052 mm and 0.067 by 0.048 mm.

Holotype male.—Wing length 1.15 mm; breadth 0.34 mm. Similar to female with the following differences: Antenna more brownish on proximal segments; plume dark brown; flagellar segments with lengths in proportion of 25-10-11-11-11-11-13-15-20-29-17-20-20; antennal ratio 0.99. Abdomen brown. Wing more slender with shorter radial cell; costal ratio 0.62. Genitalia as in Fig. 55. Ninth sternum nearly twice as broad as long, caudomedian excavation very deep, in the shape of a truncate U; 9th tergum tapering abruptly distally and becoming rounded where it joins the long slender cerci which extend just beyond basistyles. Basistyle 1.5 times longer than broad, covered with scattered long setae; dististyle 0.6 the length of basistyle, curved and gradually tapering distally to bluntly pointed tip. Aedeagus 1.2 times longer than broad, basal arch 0.2 of total length; basal arms very heavily sclerotized, very broad on proximal portions, then tapering and recurving about 60°; distal portion more lightly sclerotized, particularly so on the broad, spatula-shaped tip. Parameres very heavily sclerotized; basal arms with lateral wing-like expansion and a posterior more truncate extension; distal portion bulbous proximally, becoming more slender distally with the rounded tip continuing to just beyond basistyles.

Distribution.—Maryland.

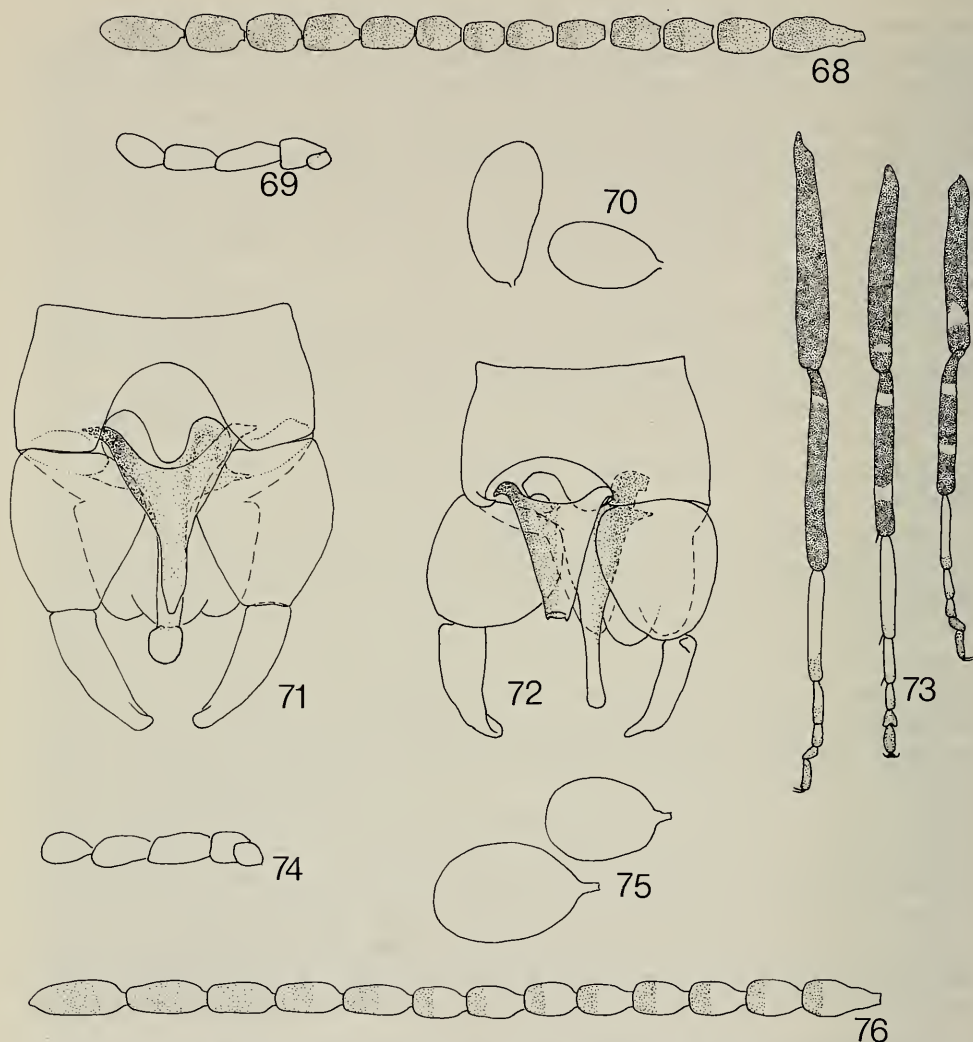
Types.—Holotype male, allotype female, 1 female paratype, Maryland, Wicomico Co., Salisbury, 25 May-7 June 1982, W. L. Grogan, Jr., Malaise trap (Type no. 76597, USNM). One male paratype, MARYLAND, Worcester Co., Snow Hill, 19 June 1968, W. W. Wirth, swept from margin of Nassawango Creek 1 mile upstream from its confluence with the Pocomoke River.

Discussion.—The specific epithet is in reference to the spatula-shaped tip of the male aedeagus which serves to distinguish this species from its closest relatives, *B. luteiventris* n. sp., and *B. flavitibia* Dow and Turner.

Bezzia texensis, new species

Figs. 72, 74-76

Diagnosis.—A small species with dark legs banded as in typical *B. bivittata*, but differing from that and all other species in the group by the following com-



Figs. 68-76. 67-71, 73, *Bezzia sandersoni*; 72, 74-76, *texensis*; 68-70, 73-76, female; 71-72, male: 68, 76, antenna; 69, 74, palpus; 70, 75, spermathecae; 71-72, genitalia; 73, hind, mid, and fore legs (left to right).

bination of characters: Small size (female wing length 0.95-1.02 mm); short, stout, banded antennal flagellum (antennal ratio 0.80); large, unequal, ovoid spermathecae with long tapering necks; male genitalia with globose basistyles, triangular aedeagus with truncate tip, and parameres broad at base with a subbasal, lateral, pointed projection.

Holotype female.—Wing length 0.95 mm; breadth 0.41 mm.

Head: Brown. Eyes very narrowly separated, a space of about two ommatidial facets, a distance of 0.022 mm. Antennal flagellum (Fig. 76) pale on basal halves of segments, light brown on distal halves; flagellar segments with lengths in proportion of 13-8-8-8-8-8-8-10-10-10-12-13; antennal ratio 0.80. Palpus (Fig. 74)

light brown; lengths of segments in proportion of 4-6-9-8-7; palpal ratio 2.25. Mandible with 9-10 large coarse teeth and 3-4 smaller basal teeth.

Thorax: Dark brown; mesonotum and scutellum with dense short stout setae on dorsal portions, entire surfaces covered with finer pubescence. Legs dark brown, with banding typically like that of *B. bivittata* (Fig. 8); tarsi pale on proximal four tarsomeres, 5th tarsomeres light brown. Wing hyaline, veins pale; costal ratio 0.72. Halter brown.

Abdomen: Brown. Spermathecae (Fig. 75) large, unequal, ovoid with long tapering necks, measuring 0.081 by 0.048 mm and 0.055 by 0.041 mm.

Allotype male.—Wing length 0.92 mm; breadth 0.32 mm. Similar to female with the following differences: Antennal flagellum with golden brown plume; lengths of segments in proportion of 22-10-9-10-10-10-10-13-18-25-13-15-17; antennal ratio 0.94. Palpal ratio 2.44. Wing more slender with shorter radial cell; costal ratio 0.63. Genitalia as in Fig. 72. Ninth sternum 1.7 times broader than long, caudo-median excavation shallow; ninth tergum tapering abruptly on basal portion until it joins the long cerci that extend to tip of basistyles. Basistyle slightly longer than broad, globose, ventral and mesal surface with long setae; dististyle about the length of basistyle, curved and tapering slightly distally to broad pointed tip. Aedeagus triangular, slightly longer than broad; basal arms heavily sclerotized, short; distal portion more lightly sclerotized except on margins, tapering distally to truncate tip. Parameres heavily sclerotized proximally, more lightly sclerotized distally; basal arms broad, recurved about 90° with pointed subbasal lateral projection; distal portion broad basally, tapering apically to a slender rod with slightly expanded, rounded tip.

Distribution.—Texas; known only from the type-locality.

Types.—Holotype female, TEXAS, Gillespie Co., Fredericksburg, 28 July 1967, Blanton and Borchers, light trap (Type no. 76593, USNM). Allotype male, 1 female paratype, same data except taken 2 July 1967.

Discussion.—The small size, pale-banded antennal flagellum, and distinctive spermathecae and male genitalia should be sufficient to distinguish this species from all others in the *bivittata* Group with banded legs and dark halteres.

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